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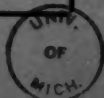
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ORIGINAL COMMUNICATIONS.

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SYMPOSIUM ON ETHMOIDS.

THE CLINICAL ANATOMY OF THE ETHMOIDAL LABYRINTH.*

DR. J. PARSONS SCHAEFFER, Philadelphia.

The ethmoidal field cannot be considered intelligently apart from the remaining paranasal sinuses. There is much overlap. The morphological and clinical problems of the ethmoidal labyrinth are better comprehended or, at least, less obscure if one bears in mind that all of the paranasal sinuses have their genesis in the ethmoidal field. With certain restrictions, the sphenoidal sinus may, for purposes here, be listed in this category. Only later, when the rudiments of the several sinuses and cells have grown sufficiently, do some of them extend variously into the neighboring fields, to form the maxillary, sphenoidal and frontal sinuses. In a sense, one may think of the large paranasal sinuses as overdeveloped ethmoidal cells, and that their names are justified only because of the topography and the relationships which are established subsequently. Indeed, the proper group of ethmoidal cells seldom remain wholly within the confines of the ethmoidal bone, but extend variously into related fields and bones. Regardless, however, of the degree of growth away from the location of the genetic area, the point of initial out-

*Read as part of Symposium on Ethmoids before New York Academy of Medicine, Section on Laryngology and Rhinology, April 23, 1930. The paper was illustrated with lantern slides of special preparations bearing on all phases of the subject.

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growth always remains and locates the ostium or aperture of a sinus or cell at all subsequent periods.

This means that all of the paranasal sinuses and cells have their outlets or ostia in the restricted ethmoidal field, despite the fact that their outlying portions may extend widely and irregularly into neighboring parts. And, while there is considerable variation in the size, shape, relations and precise location of a given ostium in different individuals, owing to genetic and growth potentialities, there is an uncanny constancy in the origin and development of a given sinus or group of ethmoidal cells from a specific general field; for example, the maxillary sinus from the dorsal half of the ethmoidal infundibulum, the sphenoidal sinus from the posterior nasal cupola, the frontal group of ethmoidal cells from the frontal recess, etc.

Thus, the morphological aspects and the clinical problems so far as they have an anatomical bearing would, at first thought, appear relatively simple. In a goodly number of cases, this is of course true. The sinuses, however, in assuming their definite form often take on bizarre shapes and relations and, not infrequently, supernumerary frontal sinuses and occasionally a true duplication of the maxillary sinus are encountered. More important still is the very common extension of the ethmoidal cells beyond the ethmoidal field into neighboring bones, there impinging upon or largely usurping the more usual site and confines of the maxillary, the frontal and the sphenoidal sinuses. Indeed, it is difficult at times to determine whether the invading cells are extraethmoidal extensions or true supernumerary sinuses of the region.

The rudiments of the paranasal sinuses are demonstrable at a relatively early time in intrauterine life, the third and fourth month of the prenatal period, a time much earlier than is generally thought. The rudiments are primarily evaginations or outpouchings of the nasal mucous membrane in more or less definite and constant portions of the ethmoidal field. All of the paranasal sinuses and cells, save the sphenoidal, have as precursors certain of the nasal meatuses or their secondary furrows.

The pre-existing nasal meatuses and secondary furrows from which the *proper* group of ethmoidal cells develop are: *A.* in the middle nasal meatus, 1. the ethmoidal infundibulum, 2. the suprabullar recess, 3. the bullar furrow, 4. the infrabullar furrow, 5. the frontal recess, 6. the frontal furrows; *B.* in the superior nasal meatus, 1. the ventral and superior extremity of the meatus proper, 2. the superior recess, 3. the inferior recess; *C.* the supreme nasal meatus.

The early ethmoidal cells are either short, tube-like spaces, potential in character, with thick mucosa, or they are dimple-like depressions. They enlarge by a positive growth, which goes hand in hand with resorption of related tissues and bone. Some of the early ethmoidal rudiments appear to become partially encompassed by the growth of surrounding tissue.

The ethmoidal cells from their beginning in the fetus are divided into two primary groups, anterior and posterior. The *anterior group* vary in number from two to eight, and they all communicate with the various parts of the middle nasal meatus. Genetically, the anterior group of ethmoidal cells is further subdivided into three secondary groups; a grouping maintained in infancy, childhood and the adult. Those cells having their outlet in the frontal recess are the *frontal anterior ethmoidal cells*; those communicating with the ethmoidal infundibulum, the *infundibular anterior ethmoidal cells*; and those related to the ethmoidal bulla, the *bullar anterior ethmoidal cells* (the middle ethmoidal cells of another terminology).

In accord with their origin, the *posterior group* of ethmoidal cells communicate with the superior and the supreme nasal meatuses, and vary in number from one to eight. The superior meatus presents three common places from which cells arise, the ventral extremity and the superior and inferior recesses.

The supreme meatus is found in about 60 per cent of adult cases, and 75 per cent of these have a posterior ethmoidal cell or cells (usually one) in communication with it.

In a series of recent observations, it was found that the simplest ethmoidal labyrinth consisted of only three cells and the most complex, of 16 cells. Regardless of the number of cells in a given case, the entire ethmoidal field is more or less occupied. Therefore, one would expect large ethmoidal cells when few constitute the group and smaller cells when many elements make up the labyrinth, a term well applied when from 12 to 16 cells are massed together in the ethmoidal region, each cell jockeying with others for a place in the field. This, of course, leads to irregularly-formed cells and not infrequently to growth away from the field primarily intended, with resultant varied and, at times, unusual relationship; moreover, the ostia or apertures of many cells come to be encroached upon or badly placed for effective drainage.

The extramural expansion of the ethmoidal labyrinth has to do with the growth of ethmoidal cells into the maxilla, the frontal and sphenoidal bones and the ethmoidal conchae or turbinates. Such cells may be designated ethmomaxillary, ethmofrontal, ethmosphenoidal and conchal.

True supernumerary maxillary sinuses and *ethmomaxillary cells* (sinuses) are not the same. Only in the sense that all of the paranasal sinuses have their beginning in the ethmoidal field, is the grouping together permissible. True supernumerary maxillary sinuses are rare, ethmomaxillary cells common.

Embryologically, the ethmomaxillary cells are derived from the superior nasal meatus, usually from its inferior recess, rarely from the supreme meatus. A true supernumerary maxillary sinus develops from the depth of the ethmoidal infundibulum and in the adult always communicates with it, points in accord with the genesis and the adult anatomy of the maxillary sinus proper. Clinically, the supernumerary maxillary sinus and the ethmomaxillary cell have much in common and their importance in practical work cannot be overestimated. All degrees of development of ethmomaxillary cells are encountered. They usually encroach upon the maxillary sinus proper at its upper and dorsal angle, at times occupying fully one-half of the body of the maxilla and extending well into the alveolar process. The ethmomaxillary cells are not infrequently overlooked, especially so when they are of lesser size. One does not expect to find them in the maxillary area; moreover, they are almost wholly without the ethmoidal field. The outlet of these cells is always located at the uppermost part of the lumen and is badly located for drainage. In these respects, the ethmomaxillary cell simulates the maxillary sinus. Fortunately, the ciliated epithelium comes to the rescue, since its mass action is always toward the ostium of the cell, regardless of its location. If, however, the ostium is encroached upon and made considerably smaller, much of the good that would otherwise come from an active ciliated epithelium is lost.

The *ethmofrontal group* of extramural ethmoidal cells is the most complicated of this series. One must recall that there are a number of genetic potentials for the frontal sinus proper, and that the sinus is at first an ethmoidal cell and only later does it become frontal in a topographic sense. Not infrequently, two or more potential frontal "anlagen" develop into frontal sinuses. In a recent series as many as six true frontal sinuses have been encountered in a single specimen. Supernumerary frontal sinuses are located variously side by side in the coronal plane, one back of another in the sagittal plane, and one above the other, tier-like in relationship.

In addition, the ethmoidal cells variously impinge upon the frontal sinuses. Sometimes one encounters a considerable labyrinth of anterior ethmoidal cells which have extended for a greater or less distance into the frontal bone and nested beneath and in front of the

frontal sinus. Such cells usually communicate with the frontal recess, although they sometimes have their outlets in the neighborhood of the bulla, or more rarely in the superior meatus. Ethmofrontal expansions into the supraorbital plate of the frontal bone are extremely common. These often are small and hug the cribriform plate of the ethmoid, again they expand widely over the orbit. It is largely an academic question whether some of these larger expansions over the orbit should be considered true frontal sinuses or ethmosphenoidal cells. It matters very little clinically what name is applied to the cells in question. The important thing is to realize that such anatomy often exists. Very frequently, regardless of the number of frontal sinuses and the more anterior of the ethmofrontal cells all have their apertures in the frontal recess. Therefore, operative procedures in this region would, in all likelihood, lead to drainage of most of them. The ethmofrontal expansions from the suprabullar furrow and the superior and supreme meatuses would, of course, not be reached by the way of the frontal recess; moreover, one must bear in mind that frequently these cells have variously-sized membranous and osseous septa which lead to the formation of recesses and pockets. Operative procedures by way of the nasal cavity would, in all likelihood, fail to effect drainage in some of them.

The *ethmosphenoidal group* of cells are also important. Not infrequently, posterior ethmoidal cells which develop from the superior and the supreme meatuses, expand into the body of the sphenoid, over and lateral to the sphenoidal sinuses, less frequently beneath it, and into its anterior wall. The sphenoidal sinus is encroached upon and some of its important relationships are lost in such cases. In turn, these structures become related to the sphenoidal expansions of posterior ethmoidal cells. All sorts of variations occur because of the extension of the posterior ethmoidal cells into the body of the sphenoid, and are most apt to be at the expense of the sphenoidal sinuses. There is one caution that should be thrown out here; that is, that the very common pockets formed by the partial osseous septa in the sphenoidal sinuses are sometimes mistaken in X-ray plates for ethmosphenoidal cells. I have never seen ethmosphenoidal cells dorsal to the sphenoidal sinus. This observation is helpful, because it is in the most dorsal and inferior portion of the sphenoidal sinus that one is apt to find the largest and deepest of the recesses and pockets, the result of partial osseous septa.

That ethmosphenoidal cells, and this despite the fact that they are often largely sphenoidal in topography, are not true sphenoidal sinuses, is proved by the fact that they communicate with the supe-

rior and the supreme meatuses, or are mere extensions of posterior ethmoidal cells. The sphenoidal sinus always communicates with the sphenoethmoidal recess, this because it develops from the posterior cupola of the early nasal fossa. In a large series of specimens, none has come to light in which true supernumerary sphenoidal sinuses are present. This is due, I take it, to the fact that there is but a single potential ethmoidal rudiment in the fetus, a fact of interest when one recalls the goodly number of potential rudiments of the frontal sinuses. In both instances the adult anatomy is in consonance with the early embryology.

The *conchal cells* found so frequently in the major middle nasal concha and in the secondary conchae, *e. g.*, the agger nasi and the processus uncinatus, are usually ethmoconchal cells. Those in the middle concha are usually mere expansions of posterior ethmoidal cells, while the agger and uncinat cells nearly always grow from the ethmoidal infundibulum. The ethmoconchal cells at times become very large and obstructive in character. They may be the seat of a mucocele or abscess. In no sense, however, do the cells owe their genesis to such pathological conditions, as is so frequently stated. It is a simple matter to follow the development of conchal cells from their genetic areas to the adult anatomy, provided, of course, suitable material is at hand. The mucous membrane is like that of the regular ethmoidal cells of the lateral ethmoidal masses. Some of the conchal cells contain a goodly number of glands. Rarely, conchal cells develop from the deep surface of the middle nasal concha directly.

The many and varied morphological factors connected with the paranasal sinuses complicate the clinical problems. Not only are the conventional anatomy and the relations of the paranasal sinuses important; the many departures of all the sinuses and cells from the so-called typical, and the many extramural extensions of the ethmoidal labyrinth in an overlap with the other sinuses frequently become problems in diagnosis and treatment. These conditions justify the leaders in the rhinological field in requiring of those who would seek to practice their specialty and to be admitted to fellowship in their learned bodies to be prepared, in addition to the usual technical and practical requirements, to give evidence of an adequate anatomic and morphologic knowledge of the parts concerned as a necessary basis upon which to build scientific clinical rhinology. Only in this way can the high standards of rhinology be maintained. One cannot conceive of a novice dealing intelligently with the varied problems of the ethmoidal labyrinth.

The Jefferson Medical College.

NON-SURGICAL TREATMENT OF ETHMOIDITIS.*

DR. J. IVIMEY DOWLING, Albany, N. Y.

The nonsurgical treatment of ethmoiditis is now recognized as safe and sound and, in many instances, to be preferred to surgical interference.

However, for its successful application, it must be resorted to in properly selected cases, and under no circumstances should anyone believe the nonsurgical methods a panacea nor attempt to make them replace appropriate surgery in cases frankly surgical. The nonsurgical methods may be resorted to not alone for the relief of symptoms and to establish cure, but also may wisely be used as preoperative procedures, thereby making necessary surgery a safer and more satisfactory method.

Ventilation and Drainage: All sinus therapy, whether nonsurgical or surgical, is governed by definite principals and in ethmoid or other sinus treatment the ends to be attained are ventilation and drainage. Healthy function of the ethmoids or other sinuses is impossible unless these essentials are present.

Mechanical faults of the intranasal structures are the prime predisposing causes of all sinus disease. Varied infections, syphilis or tuberculosis are the exciting agents that occasion the acute and promote the chronic form of disease.

It is generally conceded that ethmoid pathology is always associated with involvement of proximate erectile tissues or other sinuses. However, subsequent to the clinical cure of maxillary or frontal sinus disease, there frequently persist symptoms incident to deep congestion of the ethmoid labyrinth with extension to the sphenoids. This latter complication is so constant that the term ethmosphenoiditis is appropriate and so any nonsurgical treatment directed to the ethmoids naturally applies to the possible sphenoidal complication.

Symptoms indicative of ethmosphenoiditis are impaired cerebration, tendency to recurrence of head colds, dull pain between the eyes, vertex or occiput, erratic pains referred to the body or limbs, vertigo and ocular symptoms of very definite kind, *viz.*, muscle imbalance and even certain types of strabismus, and always suggestive are the refractive states that vary with repeated examinations and

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for which men of equal skill prescribe glasses that are shortly discarded for others of no greater benefit to the patient.

Discharges blown from nose and early morning postnasal droppings may be present but sometimes are not appreciated until after a few treatments.

The objective appearance of colloidal ethmosphenoiditis may exhibit a mere deep congestion of the erectile tissues with blocking of the adjacent meati or examination with the nasopharyngoscope may reveal minute areas of polypoid kind in the posterior parts of the middle and superior meati. Radiograms may or may not be positive because the air content of the accessory sinuses may or may not be sufficiently encroached upon to show. Although it is a repetition, the writer believes that the correct diagnosis and treatment can only be determined by means of tampons and irrigation.

These symptoms should always suggest to the oculist and rhinologist the need for ethmoid treatment.

The type of ethmosphenoiditis that is generally described under other names may well be designated *colloid ethmosphenoiditis*, which is the condition in which the natural crystalloid secretions of the membranes has been changed to a colloid state. The cells and overlying erectile tissues are in a state of pathology that obstructs the natural ostia and prevents normal ventilation and drainage. The identity of the original infection is long since lost but in its train abnormal function of the mucous membranes provides a heavy mucoid discharge that floods the circulation with irritating colloid bodies. I designate this type as colloid ethmosphenoiditis. It is this variety that is most often the causal factor in the chronicity of the symptoms as heretofore grouped.

The diagnostic factor of colloid ethmosphenoiditis is that in addition to whatever mucopus may be blown from the nose or phlegm expectorated secondary to its postnasal dropping, there is a variable quantity of jelly-like matter obtained from the ethmoids by forceable irrigation after the withdrawal of the argyrol tampons. According to the activity of the infection this mucoid matter may be golden, yellowish-white, or in the more chronic state the jelly washings may have taken on the actual color of argyrol because of the complete mixture of the silver colloid with the colloid of pathological origin.

For their relief some variety of surgery is the most frequent procedure but even then symptoms persist with the oftentimes distress of anosmia or impairment of taste.

A full consideration of all the foregoing facts is essential before selecting a choice between nonsurgical and surgical methods of treating ethmoids.

Ethmoid surgery will ever play an important place in the practice of rhinology but as the nonsurgical methods are better understood they will be given more and more consideration and possibly in the near future supplant some of the surgery now in vogue.

In the not very remote past, 2 per cent cocaine spray was the most popular nonsurgical procedure. Fortunately, that method is now taboo, for while stimulating it was never curative. Much study and clinical investigation on the part of many specialists has established recognition for a varied number of conservative methods, *viz.*, Aqueous and oily sprays, suction, aqueous irrigations, which are practically a suction method without the attendant hyperemia induced by usual tubal suction. The success of irrigations is incident to the degree of siphonage obtained.

Vacuum electrodes of the high frequency are potent aids in promoting sterilization of the intranasal tissues and adjacent sinuses.

Galvanic electrolysis with the use of copper, silver or zinc electrodes has won a merited recognition and is deserving of fuller appreciation.

Adrenalin chlorid and ephedrin are remedies so generally used that extensive discussion would not add to their recognized merits.

These methods are each and all appropriate under given conditions and have ardent advocates.

Nevertheless, there is something lacking and symptoms incident to ethmoid disease persist despite daily and long-continued treatments. Frequently surgical measures only make the patient's condition more desperate, so that even at this time of more perfect surgical technique the ultimate outcome of uncontrolled ethmoiditis is impaired sense of smell and taste associated with varied nervous manifestations that place the patients in the category of "neurasthenic".

For these reasons some more positive treatment is desirable and the writer believes that in his method of employing colloidal silver solutions he has originated a method that should be a part of the remedial technique of all rhinologists.

For its successful use diagnosis is essential and diagnosis of *colloidal ethmosphenoiditis* can only be positively determined by a trial treatment with argyrol tampons, followed by forcible irrigation with piston syringe.

Diagnosis is established after placing argyrol tampons between the middle turbinated bodies and septum well up in the olfactory cleft, which are left *in situ* until the sneezing reaction ceases. The tampons are then withdrawn and may be found to be decolorized and attached to the posterior ends of the tampons will be ropes of heavy

colloid matter, sometimes dark-colored and again lighter colored, and having the appearance of heavy mucopus.

Upon withdrawal of the tampons, immediate irrigation will dislodge a quantity of heavy mucoid or purulent matter in quantity varying from a few drops to half an ounce, usually a greater quantity from the one or other nostril. The greater quantity indicates the side of greater pathology and is usually found on the side of the more positive ethmoid block, due to any mechanical fault, such as deflected septum or turbinal pathology.

The result of such positive trial treatment establishes the diagnosis and indicates the appropriate treatment.

DESCRIPTION OF METHOD.

All silver colloid solutions are of value and may be used by the Dowling method, but after a trial of many solutions, varying in per cent, it has been found that 10 per cent solution of argyrol is the best to accomplish the most successful results in treatment by the method known as the Dowling treatment.

Before introducing the tampon, the nose should always be inspected in order to determine the width of the nares and the presence of any irregularities, for the tampon should be of such size as to reach from the anterior nares to the choanae posteriorly, and of only such thickness as will permit a snug fit without undue discomfort.

The tampons to be used are made from sterilized long-fibre cotton wound about a long, thin, wire-like applicator. The particular style of applicator and kind of cotton are essential in order that a long tampon may be properly placed by the gentle withdrawing of the applicator.

To make the tampon, the necessary quantity of cotton should be flattened and stretched to the required thickness and length; then the probe should be taken in the right hand and the cotton held on the flat of the left hand. The applicator is then placed upon the middle of the cotton which is then folded toward the body and over the wire and held in place with the thumb. The tampon, having been wound upon the applicator, should then be moistened to saturation by immersion in a 10 per cent solution of argyrol. *The average quantity that each tampon will hold is from 30 drops to one dram.* The next procedure is to introduce the cotton tampon into the naris, above the scroll of the middle turbinated body, first giving it the *sphenoid direction*, pushing it as far back as possible between the middle turbinated body and septum. After the tampon is properly placed, the wire is slowly withdrawn by giving it a twist from right

to left and at the same time giving a slight upward shove to the tampon in order to engage and hold it as high in the nose as possible. When the applicator has been sufficiently withdrawn, the handle is depressed until the wire is almost in contact with the upper lip with the tip pointing toward the infundibulum, then a final push is given in order to engage the tampon as nearly as possible in the vicinity of the infundibulum, after which the wire is finally withdrawn, leaving the tampon in its proper position.

The tampons should always be placed in both nostrils, for while one side may be more involved than the other, it is seldom that one side alone is affected, although symptoms may only be referred to a single side. It is necessary to leave the tampons in place from 10 minutes to an hour.

The use of cocain before placing the tampons is seldom required and should be avoided if possible, as best results are obtained without its preliminary use.

It is only necessary to use a single tampon in either nostril and in placing them there are two directions quite essential in order to locate them properly within the nasal chambers. The first direction I have termed the *sphenoid direction*, and the second direction is the *infundibulum direction*. An understanding of these two directions is essential to the proper placing of the tampons. The first is the primary direction employed, and the second is the final step in the operation.

The first step can usually be approximated because the middle turbinated body is generally too large to permit the placing of a tampon direct to the ostium of the sphenoid. The second step can generally be accomplished, and I have found it the absolute *sine qua non* in the placing of the tampons in order to achieve full success.

The technique to be followed after withdrawing the tampon is thoroughly flushing the nares and cleansing them of all secretions. No nebulizing oil is employed and the irrigating fluid is used at the temperature of the room. The use of cool irrigation after employing tampon treatment has been found to be most satisfactory, in that the climate of Albany during the winter months is such that the use of warm irrigation was found to be frequently followed by disagreeable after-reactions because of the relaxed state of the mucous membranes and erectile tissues. The cool solutions seem to exhibit a tonic effect upon the nasal tissues and promote the usefulness of the tampon treatment. *In some cases irrigation is contraindicated, this being especially true in women at or about the time of the menses.*

The method is especially valuable in the treatment of all varieties of ethmoiditis and it is startling to observe the quick response in many acute cases in which the chief complaint is illy-defined headache centering between the eyes, together with the associated eye complications of misty vision and inability to use the eyes as readily as generally possible.

The need for ethmoid surgery is lessened to a great degree after a course of tampon treatment and thereby many patients retain their sense of smell and taste. The routine use of Holmes' nasopharyngoscope demonstrates that many chronic cases of ethmoid disease are already in a polypoid state. In such cases tampon treatment restores the tone of the tissues and establishes the normal ventilation and drainage of the ethmoids which are now recognized as absolute necessity to the health of these parts. In many instances small polyps disappear for all time with establishment of ventilation and drainage.

A much-neglected condition is *ethmoiditis in children* persisting after the removal of adenoids and tonsils. A ready means of cure is to be had in applying nasal tampons saturated in 10 per cent argyrol solution. There is no great difficulty in doing so if the child's head is held between the knees of an assistant and the arms and legs controlled by wrapping the body with a sheet. The benefits are often appreciated by even young infants, to such a degree that after a first treatment they will submit without undue objection. In such cases irrigation can be successfully accomplished by turning the child over so that the face looks at the floor. Of course, the sheet should be used to control the arms and legs, and also the head must be held by an assistant. Parents will not object to this procedure for they readily recognize the benefits after a single treatment.

It will interest the oculist to learn that ethmoiditis in children is frequently associated with phlyctenular ulceration of the eyes, so it is only natural that through resort of this method that very intractable eye disease can be cured in a few days instead of weeks, as is usual after mere treatment directed to the eyes alone.

The prompt relief of symptoms is so positive that patients oftimes refuse surgical procedures even though the mechanical faults are such as to warrant the belief that nonsurgical measures will be only palliative.

Colloidal ethmosphenoiditis is most successfully treated by the tampon method and in cases exhibiting mechanical faults, that render likely recurrent attacks, a course of treatment by tampons will make possible an *interval operation* between attacks, thus promoting the

safety of the patient and with less postoperative reaction than sometimes occurs subsequent to ethmoid surgery.

By way of emphasis, the writer wishes to state that colloidal ethmoiditis is a distinct entity and may be the precursor of the ultimate hypertrophic variety in which there are distinct evidence of polyps or other graver pathology.

Finally, the tampon treatment of ethmoiditis is of material benefit to the asthmatic, as proven by Haseltine, of Chicago, who has accomplished much in developing a successful treatment of asthma, basing his routine on the ideas advanced by the writer. His success has been so positive that it seems warranted to advise that in all cases of asthmatics a careful study of the ethmoid pathology should be instituted and if colloid ethmosphenoiditis is demonstrated, then the author's method of nonsurgical treatment of the ethmoid complication of asthma may be instituted with reasonable expectation of enhancing the benefits derived from all other methods employed.

116 Washington Avenue.

ZINC IONIZATION OF THE ETHMOIDS.*

DR. JOHN MCCOY, New York.

In presenting to you this evening my part of the Symposium on the Ethmoids, I would like to say that zinc ionization has been introduced into the nose on my part, partly from the accident of circumstance and partly from the results which I have secured in chronic ear suppuration, and which were presented at the Ear Section of this Academy about five years ago.

If we briefly review what takes place when zinc ionization is practiced, we find that ionization is a chemical decomposition effected by means of an electric current. There are certain laws governing this decomposition. Ions are groups of atoms which result from the electrolytic decomposition of a molecule. These ions are electronegative or electropositive. The electronegative ions are called anions, the electropositive ions are called cations. Hydrogen and the metals generally are cations. The electropositive ions, or cations, tend to flow toward the negative pole. It has been found that by the use of a solution of sulphate of zinc at the positive pole and ordinary saline solution at the negative pole, it is possible to drive the zinc ions into the exudate and into the membranes of the cavities.

Zinc ionization is practiced in the following way: The nose is cleansed with warm saline solution, a solution of cocain, 4 per cent, is then applied to the part to be treated for a period of five or 10 minutes, usually with a pledget of cotton. After the pledget of cotton has been removed, the cavity to be treated is filled with a 2 per cent zinc sulphate solution or cotton wet with 2 per cent zinc sulphate is applied to the part to be treated. Now, the zinc electrode attached to the positive pole is placed in the nose so that the zinc electrode and the zinc sulphate solution are in contact. The patient is then given the other pole to hold in the hand. The current is then turned on very gradually until a strength of 4 to 8 m.amp. is reached. This is then allowed to continue for 10 minutes, when the current is very gradually turned off.

Some two-and-a-half or three years ago, a doctor presented himself at my office for a discharge of mucopus from the antrum, with symptoms of focal infection, and this was after he had had three major intranasal operations in his nose. My advice to him was to have the opening in his antrum made a little larger, but he said that he was through with operations and wished to try any other means. I then thought of zinc ionization and applied it to his antrum in the following manner:

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The antrum cavity was first cocaineized for about 10 minutes. Next, a solution of 2 per cent zinc sulphate was placed in his antrum and then he was allowed to hold the negative pole of a galvanic battery, with a milliamperemeter, in one hand; while the positive pole, which was devised by the author, was placed in contact with the fluid in the antrum. The electric current was then turned on and he was given 6 m.amp. for 10 minutes.

This was subsequently applied on two other occasions, four and eight days later, with the result that the antrum completely dried up and for two years or more has remained dry.

Encouraged by the success of this venture, the author tried it on other cases. A case of chronic frontal ethmoid and sphenoid inflammation: This patient was a young man, age 29 years, who for more than a year had been suffering from discharge from all the sinuses on the left side of his nose, and when I saw him the pain in his frontal sinus was severe. X-ray showed cloudiness in every sinus on the left side. He was ordered to have a radical operation on the frontal ethmoids and sphenoids and also on the antrum. This operation was done and seemed to result very nicely, except for the fact that he had large crusts coming from the posterior ethmoid and sphenoid. He was finally put on zinc ionization by means of zinc sulphate solution placed on a strip of cotton and applied to the ethmoid and sphenoid region. After about eight zinc ionization treatments his nose healed perfectly.

Another case: Miss S. P., age 25 years, came to me with a history of two years' nasal suppuration on the right side. The X-ray showed all sinuses on the right side to be involved. In her case the first procedure was to do an intranasal sinus operation, which opened up the antrum, ethmoid and the sphenoid. This, however, left pus discharging from her frontal sinus. There was, accordingly, injected a 2 per cent solution of zinc sulphate into the frontal sinus, while she was in a recumbent position, and the nasal applicator pushed as far upward as possible into the nasofrontal duct. Her head was then elevated, allowing the zinc sulphate to come in contact with the zinc applicator. She made a complete recovery after about eight applications and her nose is now perfectly dry. This we consider a wonderful result, as I know of no other way in which she could have gotten a dry frontal sinus unless she had a radical frontal sinus operation, with resultant scar.

These gentlemen, are a few of the cases on which I have been trying the zinc ionization, and in well selected cases they will show us about 90 per cent of recoveries.

730 Fifth Avenue (corner 57th Street).

DEMONSTRATION OF INTRA-NASAL SURGERY ON WET SPECIMEN.*

DR. SIDNEY YANKAUER, New York.

At the last meeting of this Section, Dr. Imperatori laid stress upon the importance of maintaining the integrity of the ciliated epithelial surface of the nasal interior. The importance of the ciliated epithelium cannot be overestimated. We must never forget that the mucous membrane of the nose is not merely the lining of a hole through which we breathe, but that it is a functioning organ, the removal of which from the nasal interior is injurious to the patient. It was with the relation of the importance of this fact that the operation which I am about to demonstrate was designed, for the preliminary purpose of the technique is to operate in such a manner that the epithelium will be preserved and its functions restored. To this end, the plan of the operation is to avoid removing all the mucous membrane from the ethmoid region, but to open all the ethmoid cells by removing the medial half of the ethmoid cell wall and the medial half of the partitions between the cells, leaving the mucous membrane of the interior of the cells *in situ*. The advantage of such a procedure is as follows:

In the first place, the outer walls of the cells, that is to say, the os planum of the ethmoid, is not laid bare and the bony floor of the skull is not exposed, blood vessels and nerves which pass through the floor of the skull and through the outer nasal wall are not torn out so that the paths of infection into the orbit and into the meningeal spaces are not exposed. Consequently, infection of the orbital tissues and meningitis following operation are avoided. During the last 10 or 12 years, numerous ethmoid operations have been performed, not only in my private practice but in the service at Mt. Sinai Hospital, and during all these years not a single death following ethmoid operation has occurred, although during the same time there have come to Mt. Sinai Hospital every year two or three cases of meningitis following ethmoid operations performed with a curette, in other institutions. This record in itself is unique and seems to me to prove the correctness of the theory.

In fact, the number of complications, such as orbital cellulitis, swollen and ecchymotic eyes and so-called meningismis, have been

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practically absent and the postoperative care of our ethmoid cases has been reduced to a minimum. The operation is performed entirely with punch forceps. The curette is never used. The curette is a crude and inefficient instrument, incapable of anything but rough operative procedure, and is entirely absent from our ethmoid instrumentarium.

In the specimen to be operated upon, the septum has been removed, all but a small bridge in the anterior inferior part, and all the instruments will be introduced through the intact nostril so that we will not be tempted to take advantage of the open and exposed ethmoid region in order to place our instrument at advantageous positions, which are not possible during the actual operation. We begin the operation by the removal of the middle turbinate bone, the anterior end of which is incised with Holmes' scissors and the bulk of the bone removed with the nasal snare. The posterior end requires removal with the punch forceps. Then the ethmoid cells are opened, the most prominent cell being first attacked with the punch forceps and opened. We then work our way backwards, opening the posterior ethmoid cells, removing the nasal wall of the cells and removing the partitions as far as they are thin, no attempt being made to remove the thicker portions of the partitions close to the outer nasal wall for it is in these thicker portions that the nerve and blood cells will be found. When the posterior cells have been completely opened, we find that the anterior sphenoid wall is exposed to view and we then proceed to open the sphenoid sinus. In the earlier part of my experiences the opening of the sphenoid sinus was a most precarious part of the operation for it was frequently accompanied by hemorrhage so severe and rapid that it could not be controlled except by packing the nose, and usually the operation had to be discontinued at this stage. Now, this hemorrhage came from the nasopalatine artery, which emerges from the sphenopalatine foramen, crosses the anterior wall of the sphenoid sinus below the natural orifice of the sinus and descends down the septum to the anterior nasal foramen. It is usually accompanied by the corresponding vein and a nerve. To avoid hemorrhage from this vessel we proceed in the following manner: The natural orifice of the sphenoid is located. This is not difficult after the removal of the posterior ethmoid cells. With a small punch forceps the mucous membrane of the edges of this opening is removed until the edge of the bony opening is exposed. This can be done without difficulty. The mucous membrane of the anterior wall is then separated from the bone by means of a half-sharp elevator, the separation being continued to the edge of the

choanae and laterally to the septum on one side and the outer nasal wall on the other. Into the pocket thus formed one blade of a heavy crushing forceps is inserted, the other blade being applied to the nasal surface of the mucous membrane and the entire mucous membrane crushed by powerful pressure, the forceps being held long enough to be sure that the vessel is closed by a clot. The crushed portion of mucous membrane is then incised with scissors, the flaps being laid aside and the entire anterior wall of the sphenoid below the natural orifice exposed to view. The removal of this bony wall with appropriate punch forceps is not difficult. The forceps is turned upward and the wall above the sphenoid opening removed, the removal being carried outward as far as possible until a large pear-shaped opening is made. The sphenothmoid wall is entirely removed.

It will be noticed during these manipulations that the punch forceps was frequently changed and its position in the handle altered according to the need at any particular stage, the point to be observed being that the blades of the forceps should, as far as possible, be placed in such a position that the cutting edge is parallel to the portion of bone which is to be removed, so that the cut will at all times be square across the surface of the bone. An oblique position of the cutting blades will result in a shearing cut which tears the mucous membrane and separates it from the bone. Care must be observed at this stage to look for the cell which was mentioned in the earlier part of the evening by Dr. Schaeffer and which he called the "ethmo-maxillary" cell. I have always recognized the importance of looking for this cell, although I am indebted to Dr. Schaeffer for knowing for the first time what its name is. We then proceed to work from behind forward, opening the middle and anterior ethmoid cells and the bulla cell, if one is present, working forward until the infundibular cell, whose importance was stressed by Dr. Mosher, has been opened. The nasofrontal duct is then located with the probe. The position of the probe will give a clue to the completeness of the operation in this region for if the *aggar nasi* is inspected it will be found to terminate posteriorly just above the lower turbinate in a convex manner, presenting a vertical ridge within which, just above the turbinate, the lacrimal duct is located, but if this rounded ridge be continued upwards it will reach the anterior margin of the infundibular cell. When this cell is present the frontal sinus probe will enter the nasofrontal duct some distance behind the ridge. If the infundibular cell is absent the probe will enter the nasofrontal duct just posteriorly to this ridge. The infundibular cell occasionally

forms the anterior wall of the nasofrontal duct in its lowest part. When this is present the opening of the nasofrontal duct is small and the probe is not very movable, but when this partition has been removed the probe is movable and the opening into the frontal sinus is large and free. There is one cell which I have occasionally met with in the cadaver but which I am afraid to tackle in the living, and I do not believe that my friends who operate with the curette would care to tackle it either. It is situated behind the nasofrontal duct and separates the nasofrontal duct from the floor of the anterior fossa.

During the opening of the anterior ethmoid cells, especially if the partitions between the cells are removed beyond their thin portion, it is possible to get a brisk hemorrhage from the anterior ethmoid artery, which enters the nose in this region. This hemorrhage is difficult to control but if some bone wax has been prepared for this purpose it is possible, with a small patch of it, to apply a portion of bone wax to the bleeding point and stop the hemorrhage. This is a rather difficult procedure as the hemorrhage must be temporarily controlled by one hand, by holding an applicator against the bleeding point, and the wax applied instantly, the moment the applicator is lifted from the bleeding point. I have, however, succeeded in a number of instances in controlling the hemorrhage from this point and so avoided the necessity of packing the nose.

When the operation has been completed by the removal of all of the cell walls in this manner, the nose is irrigated with saline solution so as to remove the clots and particles of bone and mucous membrane which may have remained in the nasal chambers. Occasionally during the operation there is considerable oozing from the wound surfaces. This may be controlled by irrigation of the nose with ice-cold normal saline solution, which is kept ready for this purpose, and during the operation this is usually done once or twice to clear the field, for it is of the utmost importance that every step of the operation should be performed under the guidance of vision and that there be no guesswork in applying the forceps to any part of the wound.

The nose is never packed after the operation but oozing is controlled by spraying the nose with adrenalin or thromboplastin or a solution of coagulin. After the first 24 hours, peroxid may be used and on the third day the clots are removed with forceps and regular nasal irrigations of saline solution are begun.

This completes the technique of the operation and time does not permit discussing the after-treatment in detail.

121 East 60th Street.

EXTERNAL OPERATION ON ETHMOIDS.*

DR. E. ROSS FAULKNER, New York.

The external operation on the ethmoid sinuses is usually done in conjunction with the radical operation on the frontal, and in chronic conditions an external ethmoid operation without cleaning out the frontal is very rarely done. The condition which always makes this a tempting method to employ is diseased supraorbital ethmoids which cannot be reached by the intranasal route, but I have never seen one which was not followed by subsequent trouble. The exposure of ethmoids by this route involves a partial removal of the nasal process of the superior maxilla and the lacrimal bone. When this bony framework of the nasofrontal duct has been removed, the orbital tissue fills in the space and in a short time obliterates the passage from the frontal sinus to the nose. Now, under such conditions the secretion from a normal frontal dammed back soon becomes infected and the frontal sinus has then to be opened and dealt with by one of the radical procedures. It is apparent then that if one undertakes an external ethmoid to open up supraorbital cells, the frontal should be opened and all the mucous membrane removed at the same time. If the frontal is small and easily accessible from below, a Lynch operation will be all that is necessary in many cases. I have seen numerous instances where an external ethmoid has been done and the frontal left alone, but have always seen trouble follow in the course of time. There are, however, cases where complete removal of the ethmoids can only be done by the external route and if the frontal is properly taken care of at the same time this is a proper and wise procedure.

In acute cases of ethmoiditis, where operative procedure is indicated, the external route is the route of choice. This method is indicated where the ethmoids have ruptured into the orbit and usually occurs in children, though not unknown in adults. The frontal in children may be absent, so it is entirely an ethmoid operation and the cells should be all cleaned out as thoroughly as one would clean them out of a mastoid. In older cases, where there is acute frontal sinusitis present, I have preferred to clean out the ethmoids and leave a drainage tube in the frontal rather than scrape it out at the initial operation. The frontal is subsequently, in two or three weeks,

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treated by one of the radical procedures. I do this from a fear, either real or imaginary, that opening up bone in the anterior wall of the frontal or scraping out the membrane in the acute stage is fraught with some danger of setting up an osteomyelitis, or even a meningitis. In the ethmoids, however, as one cannot drain individual cells, the whole labyrinth has to be exenterated, opening up the sphenoid as well. Just to drain the orbital abscess externally may be done if the patient is very ill and one wishes to wait till the virulence dies out in the infection, but I think it is safer to clean out all the ethmoids, as one would do in a mastoid. I think the danger of meningitis is less if the whole ethmoid is cleaned out. My experience has taught me that it is well to wait on these cases with a blowout into the orbit as long as possible and that the operation is not such an emergency as was formerly practiced. If you wait, many get well by draining through the nose, and if you do have to operate there is a better immunity and convalescence will be much more rapid.

Mucocele and osteoma are other conditions of the ethmoids which demand an external operation, and in both these conditions I consider a complete exenteration of the ethmoids advisable. An incomplete operation leaves cells opened with ragged edges, which are very slow in healing, and even if the area does heal over, the scar tissue tends to block the drainage of some of the remaining cells, leading to subsequent trouble. Owing to the presence of this scar tissue, secondary operations on the ethmoids are very difficult. I regard a partial ethmoidectomy as belonging to about the same category as a partial mastoidectomy.

101 East 58th Street.

MASKING EFFECTS OF AN INTERFERING TONE UPON A DEAFENED EAR.*

DR. JOHN GUTTMAN AND L. B. HAM, New York.

In any measurement of a hearing sensation, there are three characteristics of the incoming sound waves to be considered, namely: the intensity, frequency and quality.

The intensity, as far as hearing is concerned, is measured in terms of the "threshold of sensation" (or simply "threshold"), which is the minimum intensity of sound producing a hearing sensation. It is measured by the tuning fork, audiometer, acumeter, Galton whistle, speech, watch, etc. The last two methods tell something as to the quality of the sound heard. However, the quality of sound is not to be considered in this paper.

In order to measure the ear's faculty of recognizing different *frequencies*, there must be presented to the ear two or more tones of different frequencies. The faculty of the ear to recognize the similarity or dissimilarity of these two tones is called "the comparison or differentiating faculty of the ear." An analogous procedure of examination is employed in other sense functions,—*i. e.*, we measure the pressure sense by placing two different weights on the two palms (Weber-Fechner test); the tactile sense, by using a caliper, a compass-like instrument, with two needles at the end; the color sense, by presenting to the eye two or more differently colored wools (the so-called wool color test).

In our study, we present to the ear two tones for the purpose of comparing the ability of the ear of all degrees of acuity of hearing, to recognize the one tone in the presence of the other. To do this, we make one of the tones very loud and call it the interfering tone. This tone is raised to 50 decibels (abbreviated db.) above threshold in every case examined, excepting a few cases to be referred to later. The other tone is raised to threshold intensity value, first in the presence of the interfering tone and then without. We have called this tone the primary tone, and the difference between the two threshold intensity values (*i. e.*, with and without the interfering tone) is called the differential threshold. The interfering tone is called a "masking" tone by some authors. Important experiments have been performed by Wegle and Lane¹, showing the masking

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effects of interfering tones. More recently, experiments on masking effects of interfering tones, especially as related to paracusis, have been reported by Somerville Hastings and Gordon B. Scarff². Preliminary experiments by the authors of this paper³ showed that the diminished sensation of one tone (*i. e.*, the differential thresholds) in the presence of another loud tone was different in *normal* and in *deafened* ears. In the present series of experiments, comprising more than 70 ears, we found that:

1. In the presence of an interfering or masking tone, whose multiple value of energy above the threshold for the deafened as well as for the normal ear is of the same magnitude (50 decibels), a fractional increase of energy above threshold in the primary tone will produce a greater hearing sensation in a deafened than in a normal ear.

2. The above finding is true in the so-called conduction as well as in perception deafness. In conduction deafness the above-mentioned finding may be more outspoken.

3. The greater the deafness, the smaller the differences (*i. e.*, differential thresholds) become in the thresholds of the primary with and without the interfering tone. This statement assumes that the multiple value of the intensity above threshold is the same for all ears.

4. We found that very deafened people, examined with an interfering tone of 20 db., occasionally find it possible to hear the primary tone better with the interfering tone than without it.

The interfering tone used in most of the work was 360 cycles/sec., while the primary tones were 300, 510, 810, 1700 and 2800 cycles/sec., to an approximate of 2 per cent accuracy. Many other tones have been tried, but these seemed to serve our purposes as well as any others. In any case, it was desirable to use frequencies which gave large differential thresholds for a normal person.

An interfering tone of 700 vibs./sec. gave results in many respects similar to those of 360 vibs./sec. With an interfering tone at much higher frequencies, difficulties with differential and summational tones were experienced.

We found that changes in pressure of the receiver against the ear influenced the threshold to a marked extent, in the higher frequencies especially. We, therefore, "imbedded" the receiver in a horseshoe-shaped frame so that it was offset from the ear at a constant distance (about 0.5 in.) for all experiments. This change to the "offset" receiver seemed to be of some service, for where repetitions were made to determine approximately the accuracy of the work, the average deviations were less than 5 db.

We classified our cases of deafness as perception deafness, conduction deafness and deafness of a mixed nature. It should be emphasized that such a classification is tentative, for it is, in many instances, very difficult to draw sharp lines in the clinical examinations of these cases. In fact, there are those who doubt whether definite sharp determination in this respect can be made at all.

The theory generally accepted to explain paracusis by G. E. Shambaugh⁴, V. O. Knudson, I. H. Jones⁵ and others is based on the fact that the subjects have generally a conductive impairment and are deafened in the low tones. With an interfering noise, rich in low tones, *the magnitude of the interfering energy* above their threshold is not nearly so great as for the "normal". It is therefore claimed that they do not hear much (or any) of the noise and are not disturbed in a conversation as much as the normal person.

The explanation to paracusis here offered rests upon the following points: our experiments, based upon an equal *multiple intensity increase* of energy above each individual's threshold, show that for this case, also, the interfering tone does *not interfere as much with a deafened person* as with a normal person. It is possible, then, for a deafened person to have an advantage in conversation in the presence of a noise because of the 1. difference in thresholds which make the noise sound louder to the normal person and therefore masks the conversation more for the normal person; 2. lessened interfering effect of a tone due to increasing deafness.

EXPLANATION.

There are, in the hearing function of the ear, certain paradoxical phenomena which are difficult to explain:

1. A deafened ear hears a tuning fork by bone conduction under certain conditions better than a normal ear; as in the Weber test and prolonged Schwabach test.

2. A deafened ear hears subjective noises better than a normal ear, as in tinnitus.

3. A deafened ear hears better under certain conditions in the presence of interfering noises than a normal ear, as in paracusis.

In the present series of experiments, we have to explain the smaller differential thresholds for deafened ears as compared with those of normal ears.

In the normal ear there must be an apparatus which masks (inhibits) the perception of the weaker sound in the presence of a stronger interfering one. A logical consideration would incline us to believe that this apparatus is nonexistent or is not functioning to as great a degree in the deafened ear. What is this apparatus?

There exists in the ear a very sensitive mechanism for damping, masking or impeding the transmission of strong, unpleasant sounds. The function of this mechanism may be to protect the very sensitive perceptive apparatus, Corti's organ.

This damping mechanism acts by reflex action. The afferent branch of this reflex arch is the cochlear nerve, which is stimulated by a loud sound entering the ear. The efferent branch is the stapedius nerve, a branch of the facial nerve. This nerve brings about a contraction of the stapedius muscle. The tensor tympani muscle usually co-operates with the stapedius muscle as both muscles, contrary to the opinions of the older authorities, are not antagonists but synergists. The contraction of both of these muscles brings about an increased labyrinthine pressure, impeding the vibration of the basilar membrane and thus minimizing or hindering entirely the transmission of the primary tone. In the deafened ear, however, the afferent branch of the reflex arch, the centripetal stimulus, the sound stimulating the cochlear nerve, will not be as strong as in the normal hearing ear; therefore, the centrifugal, the efferent branch of the reflex arch, the contraction of the intra-auricular muscles, will also be weaker than in the normal ear, resulting in a diminution of damping and of diminishing the labyrinthian pressure and better transmission of the primary tone. The energy of the sound producing damping must be considerably greater than that producing the perception of the primary tone.

What proof does there exist for the above assertions?

1. There exists in the eye an analogous apparatus for the protection of the retina (the sensitive perceptive apparatus of the eye). This is the constrictor pupillae muscle of the iris. The afferent stimulus, there, is not sound but light affecting the optic nerve. The efferent branch of the reflex arch is the oculomotorius nerve acting upon the sphincter pupillae, contracting the pupil and preventing the transmission of too strong light.

Nyctalopia in the eye (a condition where a person with some affection of the eye, as in central opacity of the cornea, or as in nicotine poisoning, can see better at night than at daytime, and can read better by placing dark gray eyeglasses in front of the eyes) is analogous to a deafened ear, which under certain conditions can hear better than a normal ear.

In the eye, the diminished afferent stimulus reaching the optic nerve facilitates vision by better transmission of light; while in the deafened ear, the diminished afferent stimulus reaching the cochlear nerve facilitates hearing by better transmission of sound.

The consensus reaction in the eye, where covering of the pupil in one eye produces a mydriasis (a widening of the pupil of the other eye) is analogous to a slightly improved hearing by one ear of a C_4 (2048) tuning fork when the other ear is obstructed by a finger.

2. The cochlear palpebral test, where the orbicularis muscle, which is innervated by the facial nerve, contracts following a loud sound, shows also the existence of the reflex arch between the cochlear and facial nerves.

3. Lucae found hyperacusis in cases of facial paralysis, probably on account of the elimination of the damping action of the stapedius muscle in these cases.

4. Tinnitus will be louder at night, in silence, as the afferent stimulus of sound is diminished or eliminated so that the efferent effect (the damping effect) will also be diminished; and, therefore, noises produced by blood circulation, or metabolic changes, causing tinnitus, will also be better heard.

5. In stapes-ankylosis (otosclerosis), where, on account of the ankylosis of the stapes, the damping action of the stapedius muscle is eliminated, the increased hearing by bone conduction, tinnitus and paracusis will be very much in evidence.

6. Dahman⁶ examined, in freshly prepared ear specimens, the action of the intraauricular muscles and came to the conclusion that these muscles are not antagonists as Helmholtz and Politzer thought, but synergists, serving the regulations of the intralabyrinthian pressure.

7. Cato⁷, experimenting on cats, rabbits, etc., by laying bare the intraauricular muscles, found that these muscles contracted regularly by introducing a sound into the ear.

8. Luscher⁸ observed with a specially constructed microscope the stapedius muscle in a boy who suffered from a tear of his drum membrane after a box on the ear; he observed that the stapedius muscle would contract when a sound was introduced into the ear and relax when the sound ceased.

9. G. Zimmerman⁹ considers the middle ear not a sound conducting but a sound damping apparatus, which by the action of the intra-auricular muscles regulates the accommodation and the intralabyrinthian pressure.

10. C. S. Halpike¹⁰ states: "Cases in which the ordinary Schwa-bach is round about the normal show a marked loss in the silence room."

DISCUSSION.

The audiometer (electric acumeter) based on the vacuum tube principle, which was first devised and described by one of us (J. Guttman¹¹) and was later developed by the Western Electric Co.,¹² Pohlman, Kranz¹³ and others, contributed a great deal to the intense study on the threshold intensity values of various frequencies in their relation to deafness as a whole.

The use of the tones in the examination of the hearing functions for deafened people seems to be quite new. That it is important would appear from the fact that the ear possesses the faculty to integrate two or more pure tones into a complex sound and to analyze in varying degrees a complex tone. The latter faculty is probably of great importance to the ear for the proper perception of speech. Moreover, the ear possesses a faculty to inhibit the perception of irrelevant or unpleasant tones. The latter faculty, according to Gray¹⁴, may be either active or passive, depending upon the apercception or the mental concentration.

We have found that examinations of deafened ears by use of two tones offers new possibilities to research workers because of the smaller differential threshold value found in deafened people. Any clinical value must rest on further experiments and the elimination of many difficulties in the way of interpreting results.

The proper understanding of the physiology of the function of the ear is unquestionably very essential in the understanding of the pathology and treatment of the ear. Inasmuch as the sensation of hearing (the specific function of the ear) is of subjective nature, its study by animal experimentation is of very questionable value.

Histological examination does not give sufficient information either, since the patient whose ear was well examined functionally is rarely available for histological (postmortem) examination; and, on the other hand, the patient whose ear is available for histological examination rarely had a proper functional examination during his lifetime.

In the study of the function of the ear, we will have to consider the relation existing between sound and hearing from the physical (psychophysical), as well as from the anatomical point of view. Only then will we understand why a deafened ear under certain conditions will hear better in the Weber and prolonged Schwabach test, tinnitus and paracusis than a normal ear. Our explanation is that all this may be caused by the diminished reflex action of the nerves innervating the intra-auricular muscles, causing diminished intralabyrinthian pressure.

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ACUTE OTITIS IN CHILDREN.*

DR. G. M. VAN POOLE, Honolulu, Hawaii.

The clinical course differs from that in adults and perhaps is due partially to the anatomical arrangement in children. The Eustachian tube is shorter and more patent than in adults. This is the reason otitis is so common in children. Infectious material can very easily pass from pharynx into tube and on into middle ear. Babies are mostly in the horizontal position, the Eustachian tube lies deep in the epipharynx, which is not completely closed, like in the adult, consequently milk and vomited material can pass into the tube. This will cause an otitis and this otitis is so common in children that some otologists have estimated that 92 per cent have it. Because otitis is so common in children, Wittmack thought that incomplete pneumatization of the mastoid is caused by this otitis. He also thought that the pneumatization of the bone is caused by normal mucous membrane growing into the bone and producing the cells, and when the mucous membrane is not normal, like that produced by otitis in children, incomplete pneumatization results.

In America, some otologists have thought that otitis is caused by stomach and intestinal diseases, because in postmortems held upon children dying from these disorders, a drop of pus was found in the middle ear. This conclusion is erroneous, because a drop of pus has been found in the middle ear of 90 per cent of children dying from other causes.

The Eustachian tube in children is a natural drainage canal and when they have an otitis, the pus drains freely into the epipharynx. The drum membrane in children is much thicker than in adults. This natural drainage canal, plus thick drum membrane, will often prevent us from making an early diagnosis of otitis, which may have been present for a week or 10 days before the classical symptoms appear. There can be a very severe otitis with practically no redness of drum membrane. On the other hand, the drum membrane of any infant will become red when the child cries hard, so it is better not to make a final diagnosis from the appearance of the drum at first glance; look again.

*Read before the Fifth Annual Meeting of Hawaii Territorial Medical Association, April 22, 1930.

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In embryos, the middle ear is completely filled with connective tissue and more or less of this remains after birth, contrary to the old teaching that the connective tissue all disappears with the first breath of the child. It may even be found up to the age of 60 years and has the following places of predilection: 1. In the niches of the oval and round windows; and 2. in the attic. If the child has an otitis, the connective tissue has more of a tendency to persist, therefore, according to Witmark, in adults who still harbor this embryonic connective tissue, the pneumatization of the mastoid cells is incomplete:

In children, the epitympanum is separated from the mesotympanum by a membrane of connective tissue. This explains why children sometimes have epitympanic otitis which actually starts and remains in the epitympanum. This form of otitis is very dangerous, because the epitympanum is only 1 or 2 m.m. from the brain, and the cavity being closed, the infection can pass through the tissues and thin bone and produce a meningitis.

The bony facial canal is not completely developed in children, not closed at places, and the nerve is exposed, hence they can have a facial paralysis in acute otitis. In adults, we sometimes find dehiscences in the facial canal and these cases often have a facial paralysis, especially at the beginning of the otitis, but the prognosis is good; whereas, if the paralysis comes on later, caused by an erosion of the canal by pus, the prognosis is not good. The same thing is true in children and the paralysis is often overlooked until the mother calls the attention of the doctor to the fact that milk runs out of the side of the child's mouth when it nurses.

The sutures in the temporal bone of babies are still open, especially the petrosquamous suture, which contains the petrosquamous sinus that connects the sigmoid with the cavernous sinus. This sinus, being open, explains why it is easy to have sinus affection in children by the so-called collateral hyperemia. The child will have chills, temperature of 106° F., photophobia, opisthotonos, tics, and even convulsions. It looks like a very severe disease, but the symptoms will all disappear after a paracentesis.

Diagnosis: A young child cannot tell you if it has pain in one ear, but it will only lie on the unaffected side while nursing, and after it is three or four months old it will keep picking at the diseased ear. The ears should be examined in every case of fever that cannot otherwise be explained. Severe otitis can be completely latent, except the fever. Tubercular otitis is very often latent. In 50 per cent of children examined who died from tuberculosis, it was

found that they had tuberculosis of the bones of the middle ear. As a rule in ordinary cases, the diagnosis can be made by direct examination of the drum membrane. In small children, the mastoid cells are undeveloped, therefore an X-ray will show clouding, as a rule, only in the region of the antrum. In obscure cases, we may have to differentiate between a beginning meningitis and collateral hyperemia of the meninges. In meningitis, we find a positive Kernig, Babinski, stiff neck and scaphoid abdomen. All of these are absent in collateral hyperemia. If in doubt, make a spinal puncture which is negative in collateral hyperemia.

If the otitis is of tubercular origin, we often have a tubercular meningitis as a complication. This form of meningitis is very apt to be chronic, with intermissions, and therefore very hard to diagnose.

If a child is brought to you with an external otitis, how can you tell if it also has an otitis media? Often the external canal will be swollen shut so that it is impossible to see the drum. If it has a temperature above 101.4° F., with no general complications, it is usually otitis media. With an external otitis, the child will cry the whole day but sleep at night, whereas if it has otitis media, it will cry more at night. It hears well with externa and badly with interna. If the discharge is mucus, it is from the middle ear. As a last resort, saturate a wick of gauze with alcohol and place in external canal for 24 hours and then look into canal with a narrow speculum and if the secretion is coming from the depth, you can make a diagnosis of otitis media.

The prognosis of acute otitis is good, but there is danger of its becoming chronic.

The treatment of an acute otitis, especially if the drum is red and bulging, is to make a paracentesis. In making a paracentesis, if the child is under 18 months of age, many of the Viennese doctors give no general anesthetic, but simply hold the child while a tympanotomy is done. I can see no harm in giving the child a few drops of chloroform or whiffs of gas to deaden the sensation. A paracentesis as a rule is a very harmless operation, but in the hands of one who does not know his anatomy or is unskilled, permanent damage to the hearing can be produced. If the child's head is held a little toward the well side and we go straight in, the point of the knife can cause a luxation of the stapes and nystagmus, dizziness, vomiting, etc., will follow, and the child can have a purulent labyrinthitis with death or permanent deafness as a result.

After paracentesis, if the ear drains freely, the gauze should be changed as often as necessary to keep secretions from blocking the opening in the drum. Should the drainage stop and the child show retention symptoms like high fever, pain and sleeplessness, then do a second paracentesis.

In children, the drainage lasts longer as a rule than in adults. In Vienna, if the child shows no symptoms except a running ear, no operation is performed for many months. Do not use zeroform or iodoform gauze dressings as they will produce an acute eczema. When the secretion becomes mucus, it is a good plan to use Politzer inflation and push the tenacious material through the opening in the drum membrane. Prof. Alexander says it is absolutely impossible at this stage to force the mucus through the antrum into the mastoid cells and produce a mastoiditis. He furthermore states that the only contraindication to inflation is when the middle ear is acutely inflamed.

If the infection is caused by the streptococcus mucosus, then the paracentesis opening can heal and the drum look normal, yet the infection progresses behind the apparently normal drum membrane and much destruction can take place and an abscess of the brain form with practically no symptoms. If streptococcus mucosus infection is suspected, then draw a little peptone solution into a hypodermic syringe, put the needle through the drum membrane and aspirate some of the contents of the middle ear. Agitate this in the barrel of the syringe, and expel the contents through the needle into a test tube containing peptone solution. Incubate for 24 hours and plate out and a pure culture can be isolated and stained and the capsules demonstrated. When an otitis is caused by a mucosus infection, it is better to operate at once because the symptoms are entirely out of proportion to the amount of destruction produced.

Subperiosteal abscess as a complication of acute otitis:

To digress a little, the antrum in children is much larger than in adults and there is practically no communication between the antrum and middle ear. When the child has an acute otitis, the antrum is also infected, but very soon the mucous membrane of the middle ear becomes swollen and closes the small communication between the middle ear and antrum. The pus stays in the antrum isolated from the middle ear. Then one of five things can happen: 1. The pus can become more and more under pressure and finally force its way through the closed opening into the middle ear. 2. The pus can go backwards (seldom) and form an osteomyelitis of the bones of the skull. 3. It can break through above and produce a meningitis.

4. It can go in a mesial direction (rarely) and produce a meningitis.
5. It can burrow in an external direction and produce a subperiosteal abscess. The last is the most common, because the lateral wall of the antrum in babies is partially or completely cartilaginous and therefore has very little resistance. This is the pathology of the subperiosteal abscess and every swelling in the region of the antrum in babies, especially if the ear is dry, is suspicious of this form of abscess.

Prognosis is good.

Treatment: This form of abscess can heal spontaneously, but it is better to operate in every case. Make the common mastoid incision, but go down less and less in each layer until the pus cavity is entered. Usually there is a fistula leading into the antrum and the only thing necessary is to enlarge the fistula with a sharp curette. Sometimes the fistula leads to the tip. In either case, it is essential to be very careful with the curette because if the fistula leads to the antrum, the incus can be luxated. If it leads to the tip, the facial nerve is only about 0.5 c.m. from the tip and can be injured, with resulting paralysis. The after-treatment is the same as that employed after opening an abscess in any other portion of the body.

45 Young Building.

SACHAROMYCOSIS OF THE HARD PALATE. CASE REPORT.*

DR. HENRY A. LAISSLE, Philadelphia.

N. W., age 44 years, male, married, laborer. In May, 1928, the patient first noticed a sore on the right side of the roof of his mouth. It grew progressively larger until Oct. 10, 1928, when he was referred by Dr. Dean to Dr. Pfahler's Clinic for radium treatment, which he received, 250 m.g for 24 hours.

On Oct. 27, 1928, he was admitted to the Graduate Hospital. His temperature was 98.2°, pulse 72/80, respirations 20-25.

Past History: Typhoid fever and all of the common children's diseases, colds at frequent intervals, necessitating his confinement to bed.

Physical Examination: A small, thin man, appearing much older than his age. Head negative. Ears negative. Nose: There was a perforation of the cartilage and osseous portion of the septum, giving the appearance of lues. There was also a marked degree of saddle nose deformity. There was no history of a previous submucous resection of the septum. Mouth: All teeth had been removed. There were white, ulcerous patches about 4 c.m. in diameter on the right posterior side of the roof of the mouth and a perforation of the hard palate posteriorly. Eyegrounds negative. Keratitis and a bilateral catarrhal deafness were present. The tonsils were small and showed no particular evidence of infection. Enlarged cervical glands were noticed. These enhanced the suspicion of either lues or tuberculosis. The chest, abdomen, genitalia, reflexes were all negative. The Wassermann and Kahn reactions, as well as biopsy for malignancy, and sputum examination for tuberculosis were negative.

The blood count reported was as follows: Erythrocytes, 4,360,000; Leukocytes, 4,000; hemoglobin, 80 per cent; small lymphocytes, 10 per cent; transitional, 1 per cent, polymorphonuclear, 80 per cent; eosinophiles, 7 per cent, basophile, 2 per cent.

X-ray of the chest on March 19, 1930, revealed the following: "A small circumscribed area of opacity, not unlike a metastatic nodule, extending from each hilus and moderately invading each apex. A definite peribronchial thickening, which may be the result of an old tuberculous change. The heart shows no evidence of enlargement and the aorta is normal."

On Dec. 12, 1929, the laboratory reported on some scrapings, to contain the odium albicans.

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The patient was referred to Dr. Skillern's Clinic by Dr. Greenbaum for suggestions and treatment for *monilia albicans*.

The growth was quite extensive. It extended on the right into the openings of the hard palate and upward into the nasopharynx and along the pharyngeal wall to the base of the tongue. There was also extension to the right side of the mandible. The patient had frequent eructations of gas after eating, lost weight and was anemic. As the disease advanced there was a marked change in the temperature, pulse and respirations. The temperature varied between 98° and 103°, pulse 80-110, respirations 20-50.

For treatment, an enzyme was dusted on the parts and after five applications the growth seemed to disappear gradually. We have been using various enzymes on certain groups of fungi with success. This being my first case of this severe type of growth, it would be difficult to state with accuracy which treatment should receive the credit for the disappearance of the growth — the radium or the enzyme.

Dr. Gabriel Tucker was asked to make a bronchoscopic examination and report on the extent of the growth. The patient refused to submit and now he is too ill for such an examination. The expectoration was green and blood-tinged and negative for tubercle bacilli.

We have a few cases on record of bronchomycosis where the fungi extended downward into the bronchi and lungs, in which the sputum was tinged with blood and no tubercle bacilli, but the fungus growth was found to be the primary causative factor.

The various fungus growths are very difficult to grow and to isolate as they change their morphology on various culture media and the length of time the fungus grows on the medium.

Another report by the laboratory in this case, March 14, 1930, indicated the presence of *monilia albicans*, *staphylococcus aureus* and *bacillus protens* (by G. A. Duetz).

There has been so much misunderstanding of the various synonyms that when we receive reports from different laboratories the probabilities are that we get one of the synonyms and causes confusion as to the true identity.

The latest classification is one by Aldo Castellani, which follows: *Monilia Albicans* was given by Robin in 1853; *Odium Albicans* also given by Robin in 1853; *Syringo Spora Robini*, this was named by Quimquad in 1868; *Saccharomyces Albicans*, named by Reese, 1877; *Monilia Albicans*, named by Zopf in 1890; *Endomycetes Albicans*, named by Vuillemin in 1898; *Parasaccharomyces Harteri*, by Verdun in 1912.

Aldo Castellani did some research work in tropical and temperate zones and endeavored to show that a thrush does not cover one

condition only, but a group of similar clinical conditions due to different fungi.

The following is a classification by Castellani of fungi found in thrush: Fungi imperfecti, Family Oosporaceae Saccardo, Genus-Monilia-Person, Genus-odum-Link, Order Hemisporales Vuillemin, Genus Hemispora Vuillemin.

Asconycetes: Family Saccharomyceteacea, Reese; Genus Saccharomyces, Meyer; Genus Willia Haissen; Family Endormyctaceae, Reese; Genus Endormyces, Reese.

Fungi and Genus Monilia Person are most commonly found in thrush. The Genus Monilia, as understood by medical Mycologist Pinoy and others, do not correspond to the original species Monilia as described by Person, which are characterized by Sporophores, being simple and produce by construction at the extremities of a chain-like oval-ovoid conidia.

In recent years the mycologist used the term Monilia to yeast fungi which have a certain amount of Mycelium and never Ascus formation.

Fungi of Genus Odium is morphologically close to Monilia. Mycelial threads and mycelial spores are abundant in lesions and culture, while true budding yeast cells are absent and do not produce gas with carbohydrates.

As we journey along the field of mycology we find a number of fungi that are symbiotic in habits.

The word thrush has been used for so many years and means little or nothing. The etymology of the word is derived from the Danish *troske* and the Swedish word *torsh*, meaning thirst. We are commencing to feel now, from the derivation of the word, that thrush produces heat and heat in turn produces thirst, or is it a process of dehydration of the local mucous membrane?

We further note that the Swedes use a lichen as a cure for thrush. These lichens contain spores which inhibit the growth of monilia.

This case deserves some consideration as a case of bronchomycosis rather than a tuberculous infection.

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TONSILLECTOMY BY THE EVERSION METHOD.

DR. PHILIP S. STOUT, Philadelphia.

Nearly 20 years ago some operators began to enucleate the tonsils by everting them; that is, turning them inside out. The center of the presenting tonsil was seized with small Vulsellum forceps and gentle traction made. At the same time the tonsil about the forceps was snipped with long-handled, blunt-pointed scissors. Then the tonsil tissue was pushed to each side toward the pillars until the tonsil everted. Another way was to make a horseshoe incision curve above into the tonsil and grasp into the incision and in this way evert the tonsil. In either case a Smith or a Lewis snare was applied to the tonsil, which was now practically in the pharynx, held principally by the attachments to the anterior and posterior pillars, the

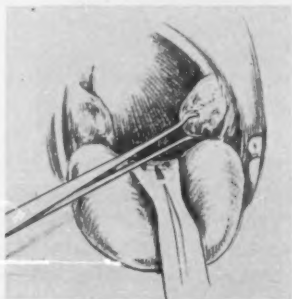


Fig. 1. Pulling out tonsil.

loop of the snare held firmly against the pillars while tightening it. Those who practiced this method claimed there was less trauma and less hemorrhage than in some of the other methods.

Within the last 10 years another method has been developed, using an Allis dissector or a Lott evertor. In this case the tonsil is grasped by a tenaculum forceps and it is then drawn well out of its fossa (see Fig. 1). The Allis dissector or the Lott evertor (see Fig. 2) is used to tear through the plica covering the lower portion of the tonsil. This allows the tonsil to evert more easily. Then the evertor is plunged into the upper part of the tonsil and the tonsil is everted (see Fig. 3). Now the tonsil is practically out into the pharynx, as in the preceding operations, only in this case the only instruments used are the evertor and the tonsil forceps, with which the operator should now take a second grasp, including the upper and lower poles

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of the tonsil. When done under general anesthesia the use of the suction tip to raise the soft palate has been a great help in protecting the uvula and taking the upper portion of the posterior and anterior pillars out of harm's way (see Fig. 4). A Lewis snare is now applied (see Fig. 5), and the loop pressed against the pillars and the shaft of the snare pressed against the cheek of the side of the tonsil being removed, tightening the snare slowly. These details add greatly to the success of the operation and the final result (see Fig. 6) is the one desired, and nearly always obtained.

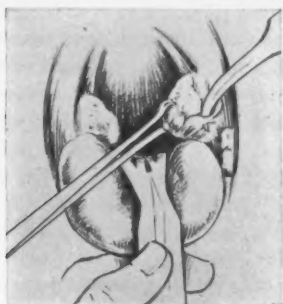


Fig. 2. Tearing through.

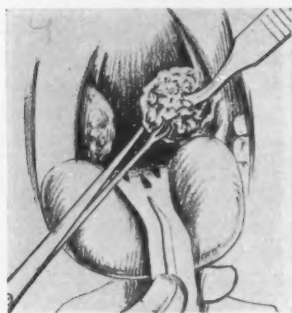


Fig. 3. Everting tonsil.

Figs. 7 and 8 show the tonsils as they are when enucleated. Observe the rough surface of the tonsil when turned inside out and the smooth surface of the so-called capsule when the tonsil is again turned right side out.

This operation can be performed very rapidly if necessary, although we do not encourage speed to the detriment of the patient or the good results of the operation. Hemorrhage is less than when sharp instruments are used outside of the tonsil¹. The evertro should



Fig. 4. Suction tip to raise soft palate and protect uvula.



Fig. 5. Snare in use.



Fig. 6. Throat after tonsil is removed.

be dull; the plica torn, rather than cut, and the evertor should not go beyond the capsule of the tonsil; the snare should be drawn up slowly. Rarely are any pieces of the tonsil left in the fossa. Local tonsillectomy is done by the same method without any difficulty. This operation can be used on any kind of a tonsil and at any age. We have used it on patients under a year and over 70 years.



Fig. 7. Tonsil after removal, inside out.



Fig. 8. Tonsil after removal, smooth capsule.

More than 15,000 operations have been done by this method in Philadelphia at the Jefferson Hospital by Dr. Lott, Dr. Deardorff, Dr. Stout and others; and at the Graduate Hospital, University of Pennsylvania, by Dr. Stout and others.

Drawings for the illustrations were made in the operating room during the operations.

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269 South 19th Street.

OBSERVATIONS AND RESULTS IN ADENOID AND TONSIL SURGERY.*

DR. DAVID H. JONES, New York.

During the past nine months it has been the writer's privilege to watch and observe the adenoid and tonsil patients attending the Manhattan Eye, Ear and Throat Hospital. In that time about 8,500 operations have been performed on adults and children. Both local and general methods of anesthesia being employed and the operations were performed by 25 operators.

In order to refresh our memory, it might not be amiss to review briefly the anatomy of the tonsil region: The tonsils are the largest of the lymphoid structures of the respiratory and alimentary tracts, lying on either side of the fauces in a recess, called the sinus tonsillar; bounded in front and behind by two folds, *vis.*, anterior and posterior pillars, also called the palatoglossus and palatopharyngeus arches. The sinus is limited below by the margin of the tongue and above by the soft palate, called the supratonsillar recess, which is inconstant in size and shape.

The tonsil is nearly spherical in shape, being greater in the longitudinal than in its anteroposterior diameter. It has an internal convex surface, being exposed in the throat, and an external surface embedded between the pillars; also an anterior and posterior border with a superior and inferior pole. Its external or attached surface is covered by a fibrous capsule from which a number of trabeculae penetrate the tonsil tissue and form a sort of network, which supports the lymphoid tissue.

On drawing the anterior pillar forward, outward and downward, we see a triangular fold of mucous membrane passing backward to the tonsil; this at the lower pole is called the plicae triangularis, and at the upper pole the plicae semilunaris. The free or internal surface of the tonsil is covered by epithelium and shows a number of openings or crypts, being lined by surface epithelium and extending deeply through its structure as far as the capsule.

Types of tonsils vary accordingly in size and shape. We recognize two distinct types: 1. The projecting or pedunculated tonsil, which varies in size and shape, some being so large as to meet in the median line. 2. The buried tonsil, the greater part of it being hidden.

*Read before the New York Academy of Medicine, Section on Pediatrics, Otolaryngology and Rhinology, Feb. 6, 1930.

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The physiological role of the tonsil is not clearly understood but one of its principal functions is to act as a defensive barrier to the entrance of bacteria into the system. Many theories have been advanced and I will mention briefly the following: 1. Absorbent glands theory, that they belong to the digestive tract and reabsorb saliva during the intervals of meals. 2. Secretory gland, that they secrete a lubricating fluid to moisten the food. 3. Embryonic remains of intrauterine life. 4. Eliminating organs. 5. Internal secretion. 6. Cytogenetic function. 7. To confer immunity. 8. Protection against bacterial invasion. This theory is one which all investigators seem to be agreed upon and after removal of the tonsil its function is carried out by other lymphoid and adenoid tissue.

Just what do we mean when we say that a patient has an enlarged or hypertrophied tonsil? It is one where we have simply an increase in size; one which might fill the tonsillar space to such an extent that its inner or free surface would extend beyond the limits of the faucial pillars or possibly its anterior border pushes the anterior pillar forward. The definition does not hold good in that type of tonsil which appears to be small, but is buried deeply in the fossa, and one can only estimate its size properly on removal.

At this time we should also have clearly in our minds: What is a septic, diseased or unhealthy tonsil? It is a chronically inflamed one in which we have recurrent attacks of inflammation associated with enlargement of the tonsillar lymphatic gland in the neck. An enlarged tonsil in a child is not necessarily an unhealthy or diseased one as far as size or structure is concerned, unless it persists and causes mechanical obstruction. Then we classify it as unhealthy.

Very often we see tonsils with cheesy accumulations in the crypts which are not pathological unless the retention is of some length of time or it is of such an amount that it becomes a focus of irritation and infection. Chronic irritation leads to enlargement, which in turn causes a lowering of the resisting power of the tonsil.

Our greatest concern is with the small, buried or submerged tonsil, which in so many patients appears to have undergone normal atrophy or one which has been incompletely removed in childhood, and when adolescence is reached we see it hidden behind the pillars and so frequently overlooked. Owing to its position, the drainage from the crypts is interfered with. This type is often the cause of infection and enlargement of the cervical glands and also gives rise to many of the local symptoms and systemic infections, and the services of a trained laryngologist are needed to arrive at a definite conclusion. Micro-organisms, *per se*, in the tonsillar crypts cannot

be said to cause diseased tonsils, but when we find on microscopical examination of the crypts that they contain pus, products of decomposition and micro-organisms. we would be correct in stating that they are virulent and capable of causing metastases.

All of us can recognize an acute inflamed tonsil, but in that type which has been termed the latent tonsil, the diagnosis is very difficult. So many patients have no throat symptoms but when the instrument closes down on the tonsil, which appeared to be only enlarged, we find a dirty, purulent, fetid discharge coming from the crypts and again, after removal, examining the areas close to the capsule, we find pockets of pus.

T. R. French, in a series of 666 cases, states that all enlarged tonsils in patients above the age of 8 years are diseased; below the age of 8 years 20 per cent were found healthy, 25 per cent doubtful, 55 per cent diseased, and between the ages of 2 and 4 years, more diseased conditions were found. The general opinion being that after the age of 5 years nearly all the tonsils are useless.

In a recent report in the *British Medical Journal*, it was shown that the absence of physical signs does not exclude the presence of a septic focus. One cannot be too careful in making painstaking observations and after excluding other suspected sites, as the nose, accessory sinuses, nasopharynx, teeth, gums, alimentary and genito-urinary tracts, we should look to the tonsils as the cause of the septic infection, bearing in mind that each individual case merits special attention. This is where the internist, pediatrician and laryngologist should co-operate.

Considering the tonsils as a focus of infection, we find in the lacunae an accumulation of lymphocytes, leukocytes and epithelial debris, and the term culture tubes has been applied to them because various forms of bacteria, pyogenic cocci, streptococci, pneumococci and staphylococci are found. These bacteria enter the body either by the bloodstream or the lymphatics and by so doing, we may consider the tonsils most frequently responsible for many system infections, acute or chronic. Thus, acute rheumatic fever, endocarditis, hematuria, albuminuria, acute nephritis, chronic rheumatism, infectious arthritis, myalgia, chorea and some of the skin diseases, may follow an attack of acute or subacute tonsillitis.

Tuberculosis of the tonsil and in the lymphatic glands occurs in about 5 per cent of the cases where the tonsil is the portal of infection.

What history, symptoms or indications do we find which will enable us to form a better opinion?

1. Careful history of recurring attacks of sore throat meaning acute or chronic tonsillitis, peritonsillar abscess (many patients complain of sore throat when they have a pharyngitis or laryngitis). Frequent sore throat and frequent colds were the main symptoms and complaint of 90 per cent of the patients applying for treatment in this series. Mouth breathing was complained of in 75 per cent. Enlarged glands occurred in 40 per cent. Peritonsillar abscess in 4 per cent. History of otitis in 20 per cent. Cardiac, 4 per cent. Rheumatism and arthritis, 12 per cent. Epistaxis, 6 per cent.

Symptoms: *Redness* limited to tonsil area, especially the anterior pillar. H. H. Lott has called attention to a new diagnostic point whereby he differentiates two distinct types of redness of the anterior pillar. In the one caused by the streptococcus hemolyticus, we find a narrow, sharply limited, very dark red zone. This is the type where we have symptoms of arthritis and neuritis and where we may expect good results from operative interference. In the second type, the zone of redness is broader and paler in color, fading off gradually, and has no definite border. Bacterial examination shows that in this type, the staphylococcus predominates.

2. Frequent colds, meaning an acute infection of the upper respiratory tract. Dochez and his assistants at Columbia University have made many interesting experiments with apes to determine if any special organism was present and have shown that whatever organism is present is of the filtrable virus variety.

3. Pain or a feeling of constant ache in the throat and shooting pains around the ears or radiating down the neck.

4. Simple hypertrophy causing interference with respiration, as in mouth breathers and in swallowing.

5. Any of the infectious fevers, scarlet fever, measles, etc.

6. Chronic ill health.

7. Nasal voice and defective articulation, causing mental apathy.

8. In those remote or general systemic conditions, as in muscular rheumatism, arthritis, neuritis, endocarditis, caused by absorption from the tonsils.

9. Remote neuropathic reflexes of the tonsillar origin, such as irritation of the pharynx, causing spasmodic cough.

10. Deafness or any chronic inflammation of the middle ear.

11. Ethmoiditis and, in fact, all diseases of the sinuses.

12. Cardio-vascular disease.

13. Enlargement of the tonsillar gland behind the angle of the jaw and also the presence of enlarged cervical glands in the anterior triangle without any local infection of the teeth or gums.

14. When we massage or press on the tonsil, especially at the upper pole, we obtain a purulent material. This may also be removed by suction and the examination of cultures taken from the surface of crypts gives little of value but must be taken from deeper in the crypts.

What are the contra-indications to immediate operation?

1. Acute inflammations of the tonsils also immediately following peritonsillar abscess, as excessive hemorrhage, is liable to occur.

2. All cases of anemia, primary, pernicious, leukemia, Hodgkin's disease, hemophilia (many cases of hemorrhage occurring in supposed hemophiliacs are not true hemophiliae), purpura and arteriosclerosis.

3. Menstruation, menopause, early pregnancy. O'Malley has suggested that there is a temporary diminished coagulability of the blood.

4. Nephritis.

5. Diabetes.

6. Thymus gland enlargement.

7. Abnormal distribution of the blood vessels.

8. Acute otitis media.

Very often we hear many reasons or objections to removal of the tonsils and adenoids.

1. The tonsils will disappear and it is frequently said that the child will grow out of them.

2. Nature must have placed them for some purpose. Of course this may be true if the tonsils are normal, but not when they have undergone hypertrophic degeneration and most of the lymphoid tissue is destroyed and it is a culture bed for organisms.

3. Removal may alter the voice. This has caused no end of discussion, both pro and con. The speaking voice is generally improved but it may take some time for the patient to relearn the complete use of the muscles which have been liberated by the removal of the tonsils.

4. Hemorrhage, which will be discussed later.

Adenoids or hypertrophy of the pharyngeal tonsil was first recognized by Wilhelm Meyer, of Copenhagen, in 1868. Adenoids are met with early in life and the same conditions which give rise to enlargement of the tonsils also cause enlargement of the adenoids, though it does not necessarily follow that they both become enlarged together. Hypertrophy of the adenoid is believed to be a local manifestation in a minor degree, of a general disturbance of the lymphatic system.

Any local or exciting cause, as an attack of acute catarrh or infectious fever, by causing a lowered vital resistance, would produce hypertrophy of the adenoid tissue and children are more susceptible to colds and infection in damp climate. Nasal obstruction will favor the growth of adenoid tissue. The symptoms vary according to the degree of hypertrophy and long-continued mouth breathing presents us the picture of the so-called adenoid facies.

Adenoids give rise to obstructed breathing and thus cause retention of the nasal secretions. The inflammatory changes in the lining membrane of the nose, caused by colds, rhinitis and coryza, extend often by continuity into the accessory sinuses, giving rise to the simplest form of sinusitis — catarrhal. Adenoids also prevent the child from blowing its nose, which is nature's way of sinus cleaning. The next most frequent symptoms are aural complications, deafness caused by Eustachian tube obstruction or a discharge from the ear. Snoring is usually present in all cases; mouth breathing, recurrent attacks of head colds, speech dull and lacking in resonance and epistaxis are other usual symptoms.

The methods used for the removal of the tonsils in this series were either a dull or sharp modification of the Sluder guillotine for children and young adults, snare and dissection for adults. In using the dull Sluder guillotine or its modification, there is much more of a tendency to cause hemorrhage, as the muscular structure is found attached to the capsule, but with the sharp blade, the capsule is smooth and glistening. More hemorrhages follow a snare operation than with a Sluder. LaForce adenatome and curette are being used for the removal of the adenoids, and from the author's observation, the complete removal of the adenoids is a much more difficult operation to perform satisfactorily. More cases of adenoid hemorrhage occurred following the use of the curette and in 20 cases where the curette had been used, the hemorrhage was stopped by the removal of a piece of the adenoid tissue.

To attain the best results following the operation, requires that we give very careful attention to our patients during the postoperative period. Many complications may occur and the one most often met with is hemorrhage. The utmost care should be taken that when the patient leaves the operating table, the tonsil fossae are dry. Two per cent of our patients were treated for hemorrhage, .013 per cent in children and .008 per cent in adults. Another observation, not mentioned in the literature, is that hemorrhage occurred twice as frequent from the right fossa and the ligatures placed on the right side were three to one on the left. In talking with a number of men,

many explanations have been advanced as to the cause. The most plausible one is that most of the operators are right-handed and cannot manipulate the instruments as well on the right side.

When called to attend a patient with a postoperative hemorrhage, we usually find the fossae filled with a clot and our first step is to assemble whatever we are accustomed to use to check our hemorrhage cases. A good light is very essential, as is also a suction apparatus. We are now prepared to remove the clot and try to locate the bleeding vessels, applying our clamp distally to the point of bleeding, then using a ligature, tying off the bleeding point. Pressure by a sponge will control some cases and in those patients where there is oozing from the fossae, it may be necessary to sew the pillars together over a gauze sponge. We have been fortunate that it has been necessary to use blood transfusion in only two cases. One death, adult, occurred from ether narcosis. General anesthesia given by trained anesthetists.

Pulmonary abscess in recent years has given rise to a great amount of discussion but in our experience at the hospital we have seen very few cases and the only reason we can give is that patients with symptoms of cough, go to a general hospital for treatment. With the system now in use, whereby the patients are given a letter on leaving the hospital, requesting them to return within the two weeks if they have any symptoms of cough, we will be able to give better supervision.

Phlegmonous inflammation of the throat, same involving the larynx, may occur. Owing to the manipulations around the Eustachian tube, we all have seen patients, especially children, complain of pain in the ears, which is usually temporary, while in others we have suppurative inflammation of the middle ear, leading to mastoiditis, also nasal and pharyngeal diphtheria. Pneumonia sometimes follows, also cardiac and renal disturbance. Rarer complications are hemiplegia, jugular thrombosis and mediastinal abscess.

At this point we cannot stress too strongly the fact that the patient should be placed in the prone position with the face downward, immediately on leaving the operating table; which position must be assumed when placed in bed. Many nurses place their patients on their backs, which allows the bleeding to go on unsuspected, and if the nurse is inexperienced she should be instructed in the difference between the appearance of fresh blood and dark grumous blood regurgitated from the stomach, also close observations of frequent movements of the thyroid cartilage, indicating swallowing of blood and rapid, thready pulse.

An ice collar will make our patient much more comfortable. Most surgeons are in the habit of ordering a gargle, usually aspirin or some combination of an alkaline or antiseptic nature. Personally, the writer does not approve of gargle because, for the average person, an attempt to gargle means simply gurgling the solution, which is supported behind by the anterior pillar and base of the tongue without reaching the pharynx and we feel that the operated structures should be left alone as much as possible. The practice of painting or swabbing the throat during the first two or three days following the operation seems unnecessary, as the grayish slough, which soon forms by a coagulation necrosis over the denuded area of the tonsil fossa, is a protection and ought not to be removed.

End-Results: A number of investigators have reported that children where tonsils have been removed are much less susceptible to gastrointestinal and respiratory conditions and improvement in health is invariably the rule. A. D. Kaiser, Rochester, N. Y., reporting on 5,000 out of 10,000 operated on the year before, found that 84 per cent were in better health.

It has been extremely difficult to check up on our results as the parents will not bring the children back three or six months after the operation, although in the 60 patients who have returned there has been a gain in weight of from one to 10 pounds in 57; in only three patients was there no gain; seven still have frequent colds; two have stumps of tonsil remaining. Postal cards have been sent but now we are using a form letter, which we trust will give better results.

Since the tonsil service was reorganized, the adenoid and tonsil work has improved greatly. More care is being taken in operating, fewer pieces of tonsil remaining; very much less hemorrhages occurring, less pillars being torn and better records are being kept, which will enable one to report valuable statistics.

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CONTROL OF BLEEDING IN TONSILLECTOMY, OPERATIVE AND POST-OPERATIVE.

DR. E. MARTIN FREUND, Albany.

Although one of the most frequently performed operations, tonsillectomy is ordinarily attended by more bleeding than are most of the major operations. There is no reasonable excuse for this wanton loss of blood that accompanies tonsil operations in this day of excellent surgical technique. There are a number of factors, however, that may explain the situation. In the first place, it must be noted that too many general practitioners do not hesitate to do a tonsillectomy, regardless of their unfamiliarity with the anatomy and pathology of the tonsil. These same practitioners would not for a moment consider doing a nasal septum operation or an appendectomy.

Tonsillectomy, on the contrary, is often more difficult to perform than is actually believed. It seems simple at times to the observer while watching an experienced operator remove the tonsils in what appears to be a very easy manner, but this apparently ease of operation is due to practice and training. Tonsillectomy at times is a dangerous operation, particularly in the hands of a man not trained in laryngology. One reason that this operation may prove dangerous or even fatal is that the tonsillar artery or other vessels may have an abnormal course and distribution, sometimes entering the tonsil tissue before subdividing. When this condition is encountered, the bleeding may be so severe as to necessitate ligation of the external carotid artery and certainly only the laryngologists or those expertly trained are prepared to resort to this maneuver when the occasion arises.

One of the most common factors associated with excessive bleeding in tonsil operations is the coexistence of a catarrhal condition in the head and chest, and this is often overlooked or disregarded. The tonsil has a very rich blood supply, being furnished by a number of fairly large arterial branches. The dorsalis lingui, ascending palatine, tonsillar, ascending pharyngeal and descending palatine, as well as a twig of the small meningeal arteries, and their corresponding veins are the major vessels that supply and drain the tonsil. Most of these branches are situated in the musculature surrounding the tonsillar capsule.

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It is thus seen that much care must be directed to the proper control of bleeding in the performance of a good tonsillectomy. The control of bleeding in these operations should not be handled in a different manner from that of any other operation, and the surgeon who tolerates a tonsil case to leave the operating room with the field still bleeding or oozing is guilty of surgical negligence, to say the least. This holds particularly true in cases of infants and children, who may have already become sufficiently debilitated prior to the operation, and who can ill afford to lose more blood and thus further lower their resistance and prolong their convalescence.

It is universally admitted that aside from the dangers of excessive hemorrhage there is the danger of tracheal insufflation of the blood, with its attendant development of bronchopneumonia or lung abscess. A very important factor resulting in unnecessary bleeding in these operations is the fact that the tonsil is not enucleated or excised completely. A completely and well enucleated tonsil will rarely, if ever, result in any undue bleeding.

The technique of a tonsillectomy should be perfected by the operator regardless of the method that he employs, whether it be the guillotine operation or the Sluder, or the enucleation and dissection, or the snare in combination with the above, or any other methods. These are all methods of choice and are equally efficient when properly done.

A very frequent cause for excessive bleeding in tonsillectomy is the uncalled for and excessive trauma to the musculature surrounding the tonsillar capsule. This structure has not yet been demonstrated actually to exist as a distinctly surrounding covering or membrane, such as that enveloping the kidney. It may be said to be an aponeurosis of very fine whitish muscular fibres arising from the palatoglossus and palatopharyngeal muscles, containing sufficient connective tissue fibres to give it the appearance of a capsular membrane. It is practically impossible to enucleate the tonsil with its so-called capsule without separating some muscular fibres by which the tonsils are attached in their respective beds. However, a careful dissection with a not too sharp instrument will result in as little trauma to the muscle fibres as possible. This is particularly feasible when there is no history of repeated inflammatory attacks resulting in considerable fibrous tissue formation. The less harm done to the muscle fibres the less bleeding will occur. It is a good procedure to dissect with blunt instruments and not with undue haste, and to tie off any bleeding points that may become apparent during the operation. Ordinary clamping and torsion of a bleeding point is

by no means a guarantee that that vessel or branch will not commence to bleed again at any time after the operation. A surgeon in performing an abdominal operation or a thyroidectomy would certainly not be guilty of leaving a bleeding vessel untied before the conclusion of the operation, and this same rule emphatically applies to the tonsillectomy as well, particularly when it is readily seen that the patient after a tonsil operation is apt to cough, gag, or vomit, thus producing additional strain and congestion at the site of operation.

The question of the efficacy of sponging with cotton or gauze is quite debatable. It is proper enough to sponge the oozing surface for the purpose of detecting one or more bleeding points, but when the sponging is relied upon entirely to produce coagulation of the open vessel, then it becomes a nonscientific procedure. Suction is superior to sponging, inasmuch as it does not obstruct the entire field in the manner that a swab or sponge does; and it also removes all excessive saliva and mucus from the patient's throat, resulting in a clear field of the site of operation.

Good lighting is a very important factor in the proper control of tonsillar bleeding. In spite of the various electrical headlights that are being marketed by commercial houses, I believe that the indirect light reflected by a head mirror gives a much smoother and brighter and more evenly distributed light in the patient's throat and permits for better observance of the entire field. The ideal operating room for tonsillectomies should be dimmed or in semidarkness to give better contrast to the reflected light into the throat.

A number of laryngologists have adopted the routine of applying a portion of the excised tonsil for several minutes to the site of its removal in the belief that it produces a local styptic effect on the operated field. They claim, but without actual or scientific proof, that the gland substance of the tonsil acts as a vasoconstrictor when applied to the open wound. This theory is not backed by scientific proof and aside from the dubiousness of this claim, it appears to be a rather septic maneuver to bring a freshly-opened surgical wound in contact with chronic or subacute infected material. If the glandular tissue of the tonsil did possess styptic or coagulant properties, then it would seem more rational to use the extract either internally or subcutaneously, not only in tonsillectomies but as a general prophylactic measure in other surgical procedures.

There exists what I believe to be a general misconception among the profession that artificial coagulants, such as horse serums, calcium preparations, etc., if taken just prior to or immediately after

a tonsillectomy will actually diminish the tendency to operative or postoperative bleeding. I cannot subscribe to this theory, mainly for the reason that if these claims were so obviously true then the general surgeon would also rely upon them as an adjunct to abdominal and other operations that he performs. In my personal observations and experiences I have not found sufficient results to justify these claims. I question their efficacy even in cases that are termed hemophilics, although in these latter cases we may feel more secure when employing them as a prophylactic. It is better judgment not to operate on a definitely known hemophilic, unless his condition urgently warrants the removal of the tonsils. However, I wish to emphasize the necessity and duty of having a blood coagulation and bleeding time test done on each patient about three or four days prior to a tonsillectomy. This is more as a gauge for secondary bleeding that may be expected than as an indication of true hemophilia.

Usually a careful history will elicit the fact that a patient is a "bleeder" and if these tests prove the suspicion then it is best not to do the operation. But if there is a tendency to delayed clotting time then it is very useful to employ the procedure that I am going to describe in the next paragraph. Of course, the administration of calcium in 5 to 10 gr. doses q.i.d. for three days prior to the operation may augment in the promotion of the blood clotting, but nevertheless one must not rely too much on the complete efficacy of this drug or similar preparations.

Experience has taught me that the best method to prevent postoperative bleeding in tonsillectomies is that employed by a number of eminent European laryngologists, who have for the past number of years adopted the routine of suturing the anterior and posterior pillars together in infants and children; and likewise in the adults with the addition of a sterilized plain or iodoform gauze tampon in the tonsillar fossa. This method may be questioned or even criticized but I believe it deserves a great deal of merit. There is no anatomical distortion following this method as may be claimed, and aside from the doubtful inconvenience of the suture removal in 24 or 48 hours, the convalescence from this operation does not differ from that of another form.

The feeling of safety and security for the patient and the peace of mind for the surgeon sufficiently recommends this procedure as an excellent one to adopt. The size of the tampon should be sufficient to completely fill the tonsil fossa or it will not accomplish its desired purpose. The pillars are then brought together at about their

midportions with one suture. Of course, it has been taken for granted that any bleeding points have been previously securely ligated. To facilitate further the removal of the tampon on the next day, it has been suggested that one or two layers of gauze dipped in albolene be placed on the tonsil fossa first and the tampon superimposed upon that gauze layer. The removal of the tampon will not take with it any granulation tissue and thus possibly start bleeding. This single or double layer of gauze is then easily washed out or removed later in the day or in the next morning.

The question of properly ligating a bleeding vessel in tonsillectomy is occasionally a trying one. The vessel must be well clamped by a flat, broad-nosed artery clamp and the ligature should be firmly and securely tied around about this bleeding point so that there is no danger of its slipping off. Number 0 or 00 plain catgut is well adapted to ligatures in these cases. It is a wise procedure never to allow the patient to leave the operating table or chair until both fossae are seen to be completely dry and absolutely free from any minute points of bleeding.

It is also wise to allow the bleeding point to remain clamped for several minutes before being tied off. Likewise in the application of the snare or the guillotine instrument, gradual compression of the tonsillar pedicle for a minute or two prior to its separation from its muscular bed is less likely to result in bleeding than a hasty separation of the tonsil from its point of attachment.

In conclusion, it should be noted that:

1. Tonsillectomy is attended by more dangers than is ordinarily believed.
2. This operation, if good results are expected, requires equally skilled surgical technique as does any other major operation.
3. Blood coagulation and bleeding time tests should be done as a routine on every patient to be tonsillectomized at least four or five days prior to the operation.
4. Haste is unwarranted and unnecessary in a tonsil operation.
5. Good and clear vision of the field of operation is absolutely essential.
6. The site of operation must be free from any and all bleeding points before completion of the operation.
7. Suction is far superior to pressure upon the tonsillar fossae with gauze or cotton sponge sticks.
8. To secure a complete feeling of relief from fear of secondary hemorrhage, the suturing of the pillars over an adequately large gauze tampon that fills the fossa is a meritorious procedure.

STAMMERING—CLINICAL STUDIES OF 150 CASES.*

DR. ROBERT M. LUKENS AND DR. MAX TRUMPER, Philadelphia.

Speech is one of the most complicated of co-ordinated movements at a comparatively high rate of speed. The three great components co-operating in its mechanical structure are: breathing, voice and articulation. It is interesting to note that each one of these three motor components has an activity more important than that of participating in vocal speech. The breathing muscles have to carry out the vital function of gas exchange. The articulatory muscles form part of the digestive tract. The voice apparatus serves as a protective device of the trachea and lungs against foreign bodies.

Stammering is a chronic, though intermittent, condition—intermittent because the stammerer usually is able to speak well in solitude. Reproductive speech offers fewer difficulties than productive, while spontaneous speech is easier than reading. The stammerer rarely has difficulty in singing and swearing. The respiratory disturbances that accompany stammering have been investigated by many workers. Gutzmann and Liebmann, in 1895, used Marey's pneumograph and found that the respiration of most cases become irregular just before speech begins and that all kinds of abnormal inspiratory and expiratory movements occur during speech itself.

But it seemed to me that in a condition where the observable symptomatology is as diverse and infinite in variety as it is in stammering, that a spirographic study of the stammerer during mental repose—when relaxed—would show a reduced number of symptoms and thereby might perhaps indicate a fundamental departure from the normal. I deemed it necessary to secure spirographic records under standard basal metabolic conditions, and I therefore made all the respiratory studies in the morning before breakfast after the subject had rested in a canvas reclining chair from 40 to 60 minutes. Having a uniform method afforded an accuracy of comparison of cases that had not been possible heretofore. All previous investigators had overlooked the fact that there are conditions, such as compensatory emphysema, asthma, etc., in which the chest expansion is excellent but the functional or vital capacity is greatly reduced. Pneumographic tracings show the excursions of the thoracic and abdominal walls, but do not indicate the volume of air which enters and leaves

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the lungs. Today we know that chest mobility is not an accurate index of the volume of respiration. Lane has shown that when an individual passes from extreme inspiration to extreme expiration, the alteration in the curve of the spinal column is a more marked feature than the elevation and depression of the costal arches. Dally, in 1923, found that increased thoracic mobility is not necessarily accompanied by increased chest measurement. The various workers who made pneumographic tracings further failed to take the precaution of requiring the patient not to take any food for at least several hours before obtaining their tracings. This is essential, for Moersch, in 1925, working at the Mayo Clinic, found that among other factors, the vital capacity is influenced by the time elapsed since the last meal.

The vital capacity is the greatest amount of air that can be expired after a maximum inspiration. The vital capacity varies with height, weight, age, sex and surface area. The advantage of a large vital capacity is that the air in the lungs need be replaced less frequently. The vital capacity does not represent the actual capacity of the lungs, for there is always a certain amount of air remaining in the lungs after the most forceful expiration. This air is known as the residual air. This plus the vital capacity equals the total capacity of the lungs. In normal breathing at rest, only 10 to 12 per cent of the vital capacity is used. This is known as the tidal ventilation.

This study deals with 150 consecutive cases of stammering which came to the Speech Clinic of Professor Twitmyer, of the University of Pennsylvania. Practically one-half of these cases had lowered vital capacities. I further found that these cases with poor vital capacity compensated for their defect in one of the following ways: 1. Increased hemoglobin and erythrocyte count. 2. Increased depth of breathing so that their tidal ventilation increased from 10 to 12 per cent (which is the normal range) to 15 or 20 per cent of the vital capacity. This increased depth of breathing I found to be inversely proportional to the degree to which the vital capacity was below normal. 3. Shallow breathing broken at intervals with a deep gasp in a more or less successful attempt to compensate for the low vital capacity.

Makuen, in 1914, reported his study of 1,000 cases of stammering before the Philadelphia College of Physicians and found that over 37 per cent of his cases had intranasal pressure, and about 60 per cent had diseased tonsils and adenoids. He also reported the case of a child who suddenly ceased to stammer after the removal of adenoids. He stated, "I thought I had made a discovery but further experience has led me to believe that the good result obtained in that

single case was unusual and in the nature of a coincidence." While we know of the possibility of shock curing stammering, I am inclined to believe that Dr. Makuen had really made a discovery and that the good result which he had obtained was not a coincidence but the consequence of the removal of an obstruction which had been causing a chronic form of respiratory fatigue. In conditions such as adenoids, the resulting fatigue causes the carbon dioxide to find its exit by channels other than the respiration. Starr in his pioneer studies on salivary pH and alveolar carbon dioxide in this laboratory of psychobiochemistry found that sub-breathing stammerers are overloaded with carbon dioxide far in excess of the normal individual. He further found that in normal individuals, the pH of mixed saliva varied directly with the carbon dioxide content of the alveolar air, thus indicating that sub-breathing stammerers would show a high alveolar carbon dioxide content, which he subsequently found to be the case. Friedman and Jackson, in 1917, found high carbon dioxide content in the alveolar air in obstructed respiration. More recently I have found that cases with nasal obstruction show a definite type of resistance-breathing. In fact, whenever I obtain a spirogram of slow, deep breathing the case is referred for nose and throat examination. Many of these cases with obstructed breathing show a tolerance for carbon dioxide when stimulated with increasing amounts of carbon dioxide. We have found it essential for these obstructions to be removed before any speech training is given.

Dr. R. M. Lukens, Laryngologist to the Chest Department of the Jefferson Hospital, examined one-third of the cases under consideration and made the following report:

Fifty-one cases of stammerers were examined and ranged in age from 15 to 27 years. There were 40 (80 per cent) males and 11 (20 per cent) females.

Nasal Findings: Only two of the 51 cases had normal noses and one of these cases had had a submucous resection. Nineteen cases had rhinitis in varying degrees of severity, 19 (38 per cent) had obstructive deformities of the septum, 43 (86 per cent) had abnormal turbinates. There was evidence of chronic sinusitis in many of these cases; however, no X-ray studies were made to check up on the sinusitis.

Pharyngeal Findings: Twenty-one (42 per cent) cases had had previous tonsillectomies with more or less satisfactory results, excepting that two of them had damaged pillars, and in seven the tonsillectomy was incomplete. Seventeen (34 per cent) of the cases had infected tonsils, some of which were small, some were hyper-

trophied and some were submerged, 10 (20 per cent) had normal tonsils. Twenty (40 per cent) of the cases had chronic pharyngeal inflammation.

Laryngeal Findings: Eleven (22 per cent) cases had normal larynges. Twenty-eight (56 per cent) had laryngitis in varying degrees, 10 had abnormalities otherwise: 8 per cent infantile epiglottitis and 16 per cent functional disorders.

In two cases there was marked fluttering of the vocal cords on deep inspiration. In one case there was clonic spasm of vocal cords following phonation.

In one case there was spasm of the arytenoideus muscle. The arytenoids when first seen on quiet respiration were separated and in the normal abducted position for respiration. Following phonation, abduction of the vocal cords and external rotation of the arytenoid cartilages occurred but the cartilages themselves were held together by spasm of the arytenoideus muscle. Of 34 cases tested for anesthesia of the larynx, 11 (32 per cent) cases apparently were anesthetic to the application of a dry cotton-tipped probe. All other cases promptly coughed with this test. In only one case was there a very short frenum of the tongue.

1923 Spruce Street, 921 Medical Arts Building.

LOADED REVOLVER CARTRIDGE IN BRONCHUS. CASE REPORT.

DR. M. P. STILES, Birmingham, Ala.

The following case is reported because of the unusual character of the foreign body, as well as the obvious problems its removal presented.

L. G., white, female, age 16 years, was seen April 27, 1929, at which time the following history was obtained: Three weeks previously, while holding a loaded .32 calibre revolver cartridge in her mouth, she suddenly caught her breath and the cartridge was accidentally swallowed. She coughed and choked for a moment, and then remained practically symptomless for 24 hours. She then began to have fever, cough, dyspnea and pain in the left side of the chest. A diagnosis of pneumonia, probably secondary to foreign

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body aspiration, was made by her physician, but her parents feared that her condition was too serious to permit the journey necessary to secure X-ray and bronchoscopic examination at the time. The symptoms gradually subsided but the physical signs remained, and so an X-ray examination finally was made, which revealed the cartridge in the left side of the thorax. She was then referred for bronchoscopy.

On admission to the hospital, the patient was free of fever and pain, but had slight dyspnea and an occasional attack of coughing. The physical signs were typical of complete obstruction of the lower lobe of the left lung. The X-ray showed the cartridge, with the bullet pointed downward, apparently in the left bronchus.

With ether anesthesia, the 6 m.m. Jackson bronchoscope was passed and the cartridge found in the left bronchus below the upper



Cartridge removed from bronchus (actual size).

lobe branch. The edema of the bronchial mucous membrane, just proximal to the foreign body, was so great that only the percussion cap of the cartridge was visible. After gently dilating the edematous ring, it was seen that the entire periphery of the flanged rim of the cartridge was so deeply embedded in the mucosa as to prevent the development of adequate forceps spaces for grasping it. After some effort, the bronchial wall was displaced sufficiently to permit the passing of a small hook around the foreign body for the purpose of pulling it up to a position proximal to the edema. Because of the conical shape of the bullet, the hook slipped off several times, but the maneuver finally was successful, and the cartridge was gently withdrawn nearly to the bifurcation, where it was grasped with forceps and removed. After an uneventful convalescence, the patient completely recovered.

Empire Building.

PEPTIC ULCER OF ESOPHAGUS.*

DR. F. S. MAINZER, Clearfield, Pa.

Peptic ulcer of the esophagus is most frequently found in the lower third of the esophagus and closely resembles a similar condition in the stomach. The condition exists more frequently than was previously thought, as many cases are first recognized at autopsy.

Since the advent of esophagoscopy, these cases are more readily diagnosed and treated. Various types of ulcers may occur in the esophagus, therefore in making a diagnosis of peptic ulcer one must exclude all other forms.

Types: Syphilitic, typhoid, carcinomatous, actinomycosis, tuberculosis, blastomycosis; those due to aneurysm, corrosive substance, foreign body, in course of acute infections, cicatrices, varicose.

Symptoms: Pain usually marked in the back of the lower third of the sternum, at times extending over the splenic area.

Dysphagia is not always found in ulcers of the esophagus, especially in the early stages. Our cases complained of this symptom.

Heartburn or similar complaint is found in the majority of cases.

Vomiting is present at times. It was present in one of our cases, probably due to the extension of the ulcer over the hiatus esophagus.

Hemorrhage and Perforation: The latter occurs in 14 per cent of the cases according to Tilleston and is usually fatal.

Case 1: F. D. was admitted to the hospital complaining of pain on swallowing, heartburn, vomiting, pain in the lower part of the sternum. The history was that the above symptoms were present for about eight months, especially the pain on swallowing. For the past four months he had been unable to eat solid foods and in case he would, vomiting of this food would take place 36 to 48 hours after it was taken. Liquids would pass through, but even these were retained at times in the lower esophagus. The heartburn would come on quite markedly when food was swallowed, lasting anywhere from then to 20 minutes.

Physical examination revealed a well-nourished male, age about 25 years. Head and scalp normal. Eyes: Pupils equal, react to light and accommodation normally. Nose normal. Ears: No discharge; hearing good. Mouth and teeth were found to be good, gums nor-

*From the Department of Bronchoscopy and Esophagoscopy, Clinic of Dr. S. J. Waterworth, Clearfield, Pa.

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mal, tongue normal, throat injected. Neck: Slight bilateral enlargement of the thyroid. Chest: Contour normal, expansion equal. Lungs: Normal vesicular breath sounds were present over the entire lung areas, no rales. Heart: Both sounds were present over the apex and aortic region, no murmur. Abdomen: Walls soft, no masses, no tenderness. Genitals normal. Extremities normal.

Laboratory Study: Hemoglobin, 86 per cent; erythrocytes, 3,900,000; leukocytes, 7,600; polymorphonuclears, 80; lymphocytes, 12; large lymphocytes, 3; transitional, 3; eosinophils, 2. Urea-nitrogen, 19.16 m.g.; creatinine, 1.2 m.g.; sugar, 91 m.g. Kahn test was negative.

Roentgen Examination: The upper esophagus appeared normal. There was marked lagging at the lower end of the esophagus, with some dilatation.

Endoscopy-Esophagoscopy: Condition of mucous membrane of posterior pharynx and pyriform sinus found to be injected, upper portion of esophagus dilated, mucous membrane of the entire esophagus down to the hiatus pasty and pale in appearance; constriction at hiatus esophagus marked. About 5 c.m. on the right posteriolateral wall there was present an ulcer about the size of a 10-cent piece, which extended over the hiatus esophagus. It was covered with a grayish exudate and slight induration was present around the outer border. A sponge was passed through the scope to remove the exudate, following which bleeding occurred. The ulcerative surface was painted with 10 per cent silver nitrate solution. The esophagoscope was teased through the constricted hiatus esophagus and allowed to remain for five minutes for the purpose of dilatation. The endoscopy procedure was carried out at weekly intervals for a period of eight successive weeks with improvement noted each time. At the last treatment the ulcerative area had entirely disappeared and it was found that the patient's former symptoms had been relieved.

Case 2: H. McG. was admitted to the hospital complaining of difficult swallowing, heartburn, pain behind the sternum and nervousness. The difficult swallowing was present for about 12 years, which condition gradually became more marked the past two years. The patient stated that she was unable to take solid foods. Liquids seemed to pass through quite well. She stated that she had frequent attacks of heartburn, especially so when taking solid foods. She thought that the greatest pain was just above the epigastrium.

Physical examination revealed that she was a fairly well-nourished female, skin bronzed. Head normal; mouth: teeth false, gums normal, tongue normal, throat injected enlarged tonsils. Neck: crico-

thyroid membrane only one finger breadth above the subclavicular notch. Very definite adenoma on the right side, which rises out of the chest on swallowing. Thyroid on left cannot be felt; it was presumed to be in the chest. Chest normal. Heart: rate rapid, functional systolic murmur. Abdomen normal. Extremities normal.

Laboratory Study: Hemoglobin, 80 per cent; red blood cells, 3,850,000; white blood cells, 7,500; polys., 70; lymph., 25; large lymph., 3; transitional, 1; eosinophils, 1. Urea-nitrogen, 19.62 m.g.; creatinine, 1.6 m.g.; sugar, 83 m.g. Kahn test was negative. Kidney efficiency: total, 50 per cent. Basal metabolic rate, plus 31. Urinalysis: specific gravity, 1.021; acid reaction, no sugar, no albumin, squamous cells, few white blood cells.

Roentgen Examination: Marked lag in lower esophagus but no evidence of malignancy. Upper esophagus function normal. Delay is due to spasm. Stomach contour is normal. There is a vigorous peristalsis. In four hours the stomach was empty and the head of the meal was at the sigmoid. Conclusions: Cardiospasm, hypermotility of the stomach and through the small intestines.

Endoscopy-Esophagoscopy: Condition found: Mucous membrane of pharynx injected, upper esophagus and constrictions are normal. The hiatus esophagus was in a state of spasm as about three minutes was spent in teasing the scope through the constriction. At the left posteriolateral wall of the hiatus esophagus and extending upward was an ulcerative area about the size of a small bean. The ulcerative area was covered with a yellowish exudate. When wiped off with a sponge no bleeding occurred. An intense hyperemia was present around the rim, mostly marked to the right of the ulcerative surface. The ulcer was painted with 10 per cent silver nitrate. This endoscopy procedure was carried out every week or two for a period of over three months. Following the last treatment the ulcerative area was found to have disappeared with relief of the patient's symptoms. Several weeks later a subtotal thyroidectomy was done by Dr. S. J. Waterworth.

Diagnosis: Diagnosis is made by the character and location of pain with dysphagia. In addition there is frequently vomiting of food. The esophagoscopy view shows a characteristic flatness of the ulcer covered with a yellowish exudate without signs of infiltration of the wall and the absence of exuberant tissue. The ulcer may be round or oval. The size varies from 1 to 8 c.m. in length. As a rule, they are single, but cases of multiplicity have been reported.

International Digest of Current Otolaryngology.

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Burghi and Gianelle, in *The Revue Francaise de Pediatrie*, Paris, October, 1929, report their observations of 116 cases of latent otitis media in infants. They found that the lowering of resistance caused by dystrophy, parathropy or serious infectious disease was a predisposing cause of latent otitis; the more important symptoms of the disease are fever, loss of weight, vomiting and diarrhea. Spontaneous recovery is rare and unless treated surgically, the otitis may be fatal.

The Thirty-Fifth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology will be held at Chicago, Oct. 27-31, 1930, with headquarters at Hotel Sherman. The guest of honor will be Dr. Emile de Grosz, of Budapest, Hungary. Included in the scientific program is a symposium on Diseases of the Nasal Sinuses and Their Relations to Disorder of the Eye. Two lectures on Progress in Oto-Laryngology will be given by Dr. Arthur W. Proetz, St. Louis, and Dr. S. J. Kopetzky, New York. Many other interesting papers are scheduled for the meeting.

Homer Dupuy, of New Orleans, in the *Southern Medical Journal* of March, 1930, describes his method for measuring intranasal distance to the sphenoid sinuses. He first presented his method in 1927, and the present article is a further contribution on the same subject. The method used is that which is credited to Dr. Amedee Granger, as published in the *Journal A. M. A.*, Oct. 20, 1923. The success of this method depends largely on the radiologist, who must furnish a technically near-perfect X-ray of the skull in the lateral position. By a perfect lateral plate is meant one wherein the outline of the sella is perfect and the curved lines formed by the greater

wings of the sphenoid are separated from each other by not more than 2 to 4 m.m. The greater wings of the sphenoid are normally in line with the anterior wall of the sphenoid sinus. The lateral view of the head is made at a target plate distance of 6 feet, taking great care that the side of the head is held correctly against the cassette. This technique allows for very accurate visualization of the sphenoid sinuses and the distance, as checked up by Dupuy in a series of 111 cases, was almost perfectly ascertained before operation.

Claus, of Berlin, in the *Zeit. f. Hals, Nasen u. Ohrenhkl.*, 26:143, 1930, reports experimental study on the closure of the Eustachian tube in the dog. In the attempt to answer the question of whether hydrops-ex-vacuo could occur on the basis of negative pressure, he closed the tube of the animal. He was unsuccessful, however, in proving his point, but he insists that this is still a likely possibility. The presence of noninflammatory fluid in the middle ear, on a basis of closure of the Eustachian tube, may very well be possible. As an example, he quotes cases of senile atrophy where the circulatory pressure has been lowered with a resultant collection of fluid in the middle ear.

KELEMEN.

Leech, of Providence, R. I., in the *Rhode Island Medical Journal* for March, 1930, writes on the Gradenigo Syndrome. He reports four cases of the condition and comes to the following conclusions: 1. Gradenigo's syndrome occurs most frequently in patients between five and 15 years of age; 2. the pneumatic type of mastoid is more prone to be associated with the syndrome than the sclerotic type; 3. the simple mastoid operation should be resorted to as soon as possible after the onset of Gradenigo's syndrome, regardless of whether or not clinical or Roentgenographic findings justify a diagnosis of surgical mastoiditis.

Lifschitz, of Kiev, in the *Zeit. f. Hals, Nasen u. Ohrenhkl.*, 26:245, 1930, discusses the influence of general and local anesthesia on the blood pressure in operative otolaryngological cases. Just prior to the operation in most cases the blood pressure is raised and in the beginning of general anesthesia or local anesthesia, it probably goes still higher. In local anesthesia the blood pressure goes up partially from psychic factors and partially from the adrenalin which was used. In the postoperative period, the blood pressure following local anesthesia has fallen to normal at the end of 24 hours, while following general anesthesia it remains raised for as long as 14 days.

KELEMEN.

Kelemen, of Budapest, in the *Zeit. f. Hals, Nasen u. Ohrenhkl.*, 26:139, 1930, reports a case of thrombosis and embolic lung infarct following submucous resection. He operated on a 39-year-old patient and 48 hours after the operation there was a thrombosis in the left leg, and 48 hours after that, an embolic infarct in the right lung. The case ran a smooth course with complete restitution to integrity. This is the first time that this complication following submucous resection has been reported.

Marx, of Wurzburg, in the *Zeit. f. Hals, Nasen u. Ohrenhkl.*, 26:133, 1930, discussed the relationship between carcinoma and cholesteatoma of the ear. He examined the temporal bone of a woman who had been sent in with inoperable carcinoma. He found cholesteatoma in the middle ear on both sides, the left ear having undergone spontaneous healing; the right side, however, developed into an epithelioma. From this case the author suggests that a middle ear epithelioma arises typically from cholesteatoma. KELEMEN.

George Warren Pierce, of San Francisco, in the March, 1930, issue of *Surgery, Gynecology and Obstetrics*, presents a most interesting paper on the Reconstruction of the External Ear. The article is very well illustrated and shows the various steps in his operations. He uses skin and cartilage grafts and reconstructs the auricle in such a way that the ear does not shrink and it maintains a normal angle to the head. His whole procedure is done under local anesthesia and requires very little hospitalization. Many of the finer details of the contour may later be obtained by further plastic manipulations.

THE AMERICAN BOARD OF OTOLARYNGOLOGY.

To better carry on its work the American Board of Otolaryngology will increase the certificate fee from \$25.00 to \$50.00—the new rule becomes effective Jan. 1, 1931.

An examination was held in Detroit, Mich., Monday, June 24, 1930, at which time 78 candidates were examined, of which 65 were passed, one conditioned in pathology, and 12 failed.

The next examination will be held in Chicago, Monday, Oct. 27, 1930. Those interested will please advise the Secretary, Dr. W. P. Wherry, 1500 Medical Arts building, Omaha, Neb.

DR. W. P. WHERRY, Secy.

DR. H. P. MOSHER, Pres.

THE NEW YORK ACADEMY OF MEDICINE.

SECTION ON LARYNGOLOGY AND RHINOLOGY.

Meeting of Dec. 20, 1929.

Allergy in Rhinology. Dr. Robt. A. Cooke.

(To appear in a subsequent issue of THE LARYNGOSCOPE.)

Relation of Sinus Diseases to Vasomotor Disturbances. Dr. Lee M. Hurd.

Published in full in THE LARYNGOSCOPE, July, 1930.

The Diagnosis of Vasomotor Disturbances of the Nose. Dr. Louis Hubert.

Vasomotor disturbances of the nose are brought about by an irritant reflexly stimulating certain nerves within the nose. The resulting reaction is an outpouring of a clear, watery discharge, with or without sneezing, and is designed to remove the irritant. This reaction may be so slight that no attention is paid to it and considered normal. In certain individuals of a neuropathic disposition, whether inherited or acquired, it may become violent and uncontrollable. However, we may consider it nothing more but an exaggeration of a normal reaction in a hypersensitive individual, and not caused by an infection or inflammatory process.

The diagnosis of vasomotor disturbances of the nose will depend upon an understanding of the physiology of the sympathetic nervous system of the nose, on the clinical history, the physical examination of the nose, including X-ray studies of the nasal sinuses, the character of the nasal discharge and the cutaneous tests.

Examination of the Nose: During an attack it is very difficult to examine the nose. On account of the edematous and swollen mucous membrane, practically no landmarks are visible. The color of the mucous membrane may be pink or reddish, but generally there is an absence of an inflammatory process, and the mucous membrane has a peculiar pale, grayish and edematous appearance. In the interval between the periodic attacks the nasal mucous membrane usually resumes its normal aspect, and an examination of the nose at this time is practically negative.

The most important single aid in the diagnosis of these disturbances is the examination of the nasal fluid for pus cells. If pus is present we can at once exclude a pure vasomotor disturbance, as pus is an evidence of an inflammatory process. Do not depend upon the patient's statements whether or not the discharge is clear and watery, as their observations are often erroneous. The nasal fluid is collected in a test tube. It may be clear and is then considered free from pus. When the fluid is turbid it is examined microscopically. In a considerable number of patients a large or moderate amount of pus cells are found in the nasal fluid. These patients, if carefully examined, will show evidence of slight nasal pathology even in the interval between the attacks. Small polypi or a polypoid degeneration of the middle turbinates may be found. Free pus in the nasal cavity is never seen. The color of the nasal mucous membrane is often pale grayish, and it is this peculiar color that suggests to us the diagnosis of a vasomotor disturbance. The real nature of this disturbance is obscured by a latent and mild form of sinusitis. That this observation is correct can be shown by testing the nasal fluid. On several occasions it may be perfectly clear and at a subsequent examination it may contain a considerable number of pus cells. It is therefore necessary to repeat the test several times when we suspect a latent type of sinusitis. The trickling down of the irritating discharge at certain times makes the already sensitive nasal mucous membrane hypersensitive and produces the attack. That this discharge is very irritating is shown by the fact that in some patients the vestibule of the nose and upper lip become excoriated. This condition is never observed in a pure vasomotor disturbance. According to this test I have divided these patients into two groups. 1. Patients with a pure vasomotor disturbance. There is no pus found in the nasal fluid on repeated examination, the nasal mucous

membrane returns to its normal appearance after the attack is over, and the result of the treatment, which is not nasal, but general, is quite satisfactory in a large proportion of the cases. 2. The second group includes patients with a latent and mild form of sinusitis, with more or less continuous nasal obstruction, with evidence of slight nasal pathology, with pus cells in the nasal secretion and the very difficult response to treatment unless the seat of the obscure and latent sinusitis has been demonstrated by a good X-ray plate, and eradicated by medical or, usually, surgical means. The treatment in these cases is primarily nasal, but intranasal treatment alone will not cure them. General treatment must follow. In this second group of cases asthma develops frequently.

The purpose of this paper is to call attention to this simple and easy test for pus cells in the nasal fluid. It is not only a time-saver in arriving at a differential diagnosis, but also a money-saver. If pus cells are found in the nasal fluid, our next procedure should be to X-ray the nasal sinuses and not to spend money on the cutaneous tests. However, if the nasal fluid is perfectly clear on repeated examination, the cutaneous tests should then be made. These tests, which form the cornerstone in the diagnosis of hay fever, were of little diagnostic value in our cases.

DISCUSSION.

DR. ANDREW A. EGGSTON: There is no denying the fact that Dr. Cooke, Dr. Walker and others have rendered a great service to medicine in bringing to us in a more practical way the whole question of allergy and its relationship to disease. There is no doubt that a very practical condition of allergy does exist. Whether it is a symptom of a deranged metabolism or abnormal internal secretion, or a distinct disease entirely is not known. The explanation of an hereditary basis is not very satisfying and of little practical value. There must be some other basic reason why some people become sensitive and why others do not, even in the same family. However, our failure in explaining the cause of allergy is not as important as the fact that it does exist. To me it exists as a symptom of many general conditions.

As a result of numerous investigations there has been developed a very valuable laboratory test, which is the skin test for sensitization. There are many techniques; some are a little better than others; some have their advantages and others their disadvantages, but it is quite comparable to the Wassermann reaction in value, and another laboratory procedure which can be used in the diagnosis of disease has been definitely established.

No doubt there are a lot of disease phenomena that, as time goes on, will be explained on the basis of allergy. Most infections at some time or other will fall into the classification of individuals showing particular sensitivity to the toxins and bacteria of specific diseases. Several diseases have already fallen into that classification, namely, diphtheria, scarlet fever and probably tuberculosis. The tuberculin test has been used for a long time at the Manhattan Eye and Ear Hospital. It is particularly of value in eye diseases. From three to four hundred tuberculin tests are done there yearly and there is a distinct relationship between positive reactions in patients and the progress of diseases in the eyes, such as chorioretinitis, cyclitis or iritis. The relationship is further substantiated by the fact that these people are improved under tuberculin treatment. In these cases, I do not know whether the results are specific, or whether we get up a better metabolism of the patient by giving them a protein to which they are sensitive. Undoubtedly, not all patients who react positively have tuberculosis of the eye, but the mere giving of protein to which they are sensitive results in benefit. In these cases, the tuberculin test is usually read in 24 to 48 hours, and I think others make an error in reading bacterial sensitization tests in an hour or in 15 minutes. One will not get positive reactions under those circumstances, but an intradermal test of bacterial protein should be read in 24 to 48 hours after the injection. Particularly in asthma, and in some of the perennial rhinorrhea cases, we have used bacterial vaccines prepared from the nose, tonsils and intestines and have been surprised at the number of cases who give reactions to suspensions of *B. coli* organisms which are constantly present in the intestinal tract. I speak specifically of the value of these bacterial tests in nose conditions, and feel particularly fortunate in being able to observe a lot of these cases with men who work in that specialty.

We will dismiss hay fever from this discussion, as everybody will admit it is simple to get a positive reaction in this disease, and to my mind it is not the subject which we want to discuss this evening and to which the titles of the papers do not refer. Asthma, likewise does not logically come under discussion this evening. Vasomotor rhinitis is certainly different practically from hay fever and asthma, even though not theoretically. Vasomotor rhinitis cases are apart and aside from those cases in which you can specifically determine active sensitization reactions. I refer to those patients who wake up in the morning and start in with machine gun sneezing, which continues for an hour or two and then subsides without definite pathology in the nasal mucosa. These unfortunates are particularly miserable and the sensitization test is particularly disappointing as an aid to diagnosis. I do not know of any condition to which a man would add more to human relief than could be done if he could find out some cause for vasomotor rhinitis. A certain number of these patients, however, will react to the proteins and the sensitization test is important and should be performed in order to eliminate allergy. A certain number of vasomotor people will show sensitizing phenomena, particularly those who work in places where there is dust; for instance, bakers, and also in some instances people who use face powder. But even in those cases the injection of specific protein offers not the relief hoped for by having found the particular exciting agent, so there still exists a doubt as to whether sensitization is the basic phenomenon that is the cause of the symptoms. Another thing about these vasomotor cases from the practical standpoint is that most of them have not occurred in children. They have been in people past puberty and not in very old people. Most of them have been in young adults. I do not know whether that means anything or not, but it is an observation which has impressed me.

I certainly do think that as time goes on we shall pay more attention to bacterial sensitization. Because we do not get reactions may express our weakness in being able to determine the right protein to use in doing these sensitization tests and when this is done, probably the cause of vasomotor reaction will be determined.

As to the treatment, even in asthmatics where one has found sensitizing reactions, the treatment sometimes is very disappointing. I am not unmindful of the cases of asthma that are miraculously relieved by simply avoiding the substances to which they are sensitive, and the relief occasionally obtained by the injections of proteins. The immunization of patients can be done in some instances, and it cannot be done in others. On the other hand, speaking from the aspect of the rhinologist, there has been a lot of meddlesome surgery done in cases that are vasomotor irritation cases. I think a lot of these patients have been operated upon in the past and have been injured, not benefitted, and the same surgeons nowadays would not operate upon them. On the other hand, I cannot help but recall a great many cases of asthma that have been relieved at the hospital by sinus operations and by removing the tonsils, and by removing other foci of infection, so it seems there is a common ground that we must occupy. I think that the allergist should seek the opinion of a good rhinologist in regard to any pathology or pus in the nose, and should not go blindly ahead and give serum without having this co-operation. I do not believe that one can relieve an asthma patient with a specific or nonspecific protein, or a bacterial protein, if that patient has pocketed pus in any location. On the other hand, the rhinologist who sees a case of asthma is not doing his duty by the patient unless he also finds out whether the patient is sensitive. There should be perfect co-operation between these two specialists in order to give these sufferers the best chance of cure.

DR. WILLIAM S. THOMAS: I am unprepared to make any formal discussion. I think it is a very happy occasion for the allergists and the rhinologists to meet. It is an occasion which augurs well for the future of our respective specialties. It seems to me that the closing words of the gentleman who last spoke are full of wisdom—that the allergist should not consider his work completed until he has referred his cases to a competent rhinologist, who can tell him better than anyone else whether his patient is infected or not, and I think it is just as important for the rhinologist to recognize that there is such a thing as allergy in the cause of this condition that we are speaking about

tonight, this vasomotor rhinitis, and right here I am going to venture to suggest—not perhaps to add confusion by offering another term—but to suggest a substitute for the term vasomotor rhinitis. It seems to me that that term fails in two respects; first, in the matter of omission, it fails to include all it means. These patients suffer from suffused eyes, from having their ears itch and their throats itch; they have something more than trouble with their nose. Secondly, vasomotor rhinitis is a term which errs in commission, in that it indicates that there is an inflammation by its ending of *itis*. It is not a true inflammation; therefore, this is not a good term, and I offer to you the use of the term *allergic coryza*.

I have been interested in studying under the microscope the nasal secretions of people with this allergic coryza for the past few months with the stains used in hematology. I find that allergic patients with nasal allergic symptoms regularly show a predominance of eosinophiles. Almost without an exception they show from 4 to 60 per cent of eosinophiles among their polynuclear leukocytes, and other forms and even in those patients who have what is apparently a purely serous discharge it is surprising to find how many leukocytes there are, and how many of those leukocytes are eosinophiles. The significance of that is of course unknown to me, and I hope that some day the relation of eosinophilia to allergy will be understood.

The papers of the evening are of a high order, and it has been a privilege to hear them. I have listened to a good many discussions of this kind, and there always seems to be an element of confusion. Here we had an allergist speaking on his side,—a master who has given us a lucid and very helpful discussion of his subject, and a rhinologist with his positive opinions and the results of his opinions drawn from a large experience purely from the rhinological side. I think the occasion is one which demonstrates the wisdom and necessity for the allergist to understand and appreciate the sphere of the rhinologist, and vice versa for the rhinologist to understand the sphere and work of the allergist, but they have to avoid overlapping in their functions. I think, in other words, that the shoemaker should stick to his last.

DR. LOUIS HUBERT: I have one particular instance of a sensitization due to the colon bacillus. The man who has a shoe store near the Manhattan Eye and Ear Hospital has been suffering from a so-called vasomotor rhinitis for years, and he did not respond to any treatment. We took a culture from his nose, and recovered a pure culture of colon bacillus from his nasal secretion, from which a vaccine was made, and he got absolutely well after that vaccine was given him. I see him almost every day, and it is two years now since he has had an attack.

DR. ROBERT A. COOKE (closing the discussion): I do not think there is anything in particular I can add to the discussion. It has been a most interesting experience for me, and I should say a most profitable evening, because I have had an opportunity to hear discussed from a different viewpoint a subject in which we all have so much in common. I would only like to say to Dr. Eggston that I should have mentioned, when I said in our bacterial tests that we were not giving satisfactory results, that I was not considering the immediate reactions, which are practically negative. I was only considering the 24 to 48-hour tests. We have not been able satisfactorily to correlate positive reactions with the bacterial findings in these cases. I do believe that there is such a thing as bacterial allergy. I believe it has many manifestations, and I mentioned to you the one in which Dr. Neal has demonstrated an immediate positive reaction to the diphtheria toxin. That is a step in the proper direction. The chances are that there will be many phases of this reaction; of which the tuberculin test is of course one.

DR. LEE M. HURD (closing the discussion): I have looked up 169 allergic sinusitis cases, and in those cases which I have reported some of them were striking. Another thing which has impressed me with so many women with so-called vasomotor rhinitis, they never go on to sinus involvement. We do nothing for them, and they keep on having a pale watery nose. A few vasomotor cases are very simple; you catch them on their histories of waking with a headache in the morning and the nose running, due to bed clothing, but these cases never go on to a sinus. Apparently for sinus involvement there must be a superimposed infection.

SECTION OF OTOTOLOGY.

*Meeting of Jan. 10, 1930.***Case of Objective Ear Noises.** Dr. Alfred Schattner (from Dr. Rae's Clinic at the Manhattan Eye, Ear and Throat Hospital).

The patient, a young man, age 21 years, stated that he had lost 12 pounds in the past three months. He appeared delicate and of a nervous temperament. He was admitted to Dr. Rae's Clinic at the Manhattan Eye, Ear and Throat Hospital with a history of a ticking noise in the right ear since July, 1927; he had the same condition in the left ear, though not so loud, lasting six months from the same date. His father was living and well; his mother was dead, cause unknown. There was no history of any ear disease in the immediate family. The patient had measles as a child.

After swimming in July, 1927, the patient thought he had water in his ears, and tried to shake it out. The noise was very loud at the time (like a regiment in the firing line, he states); this lasted for about a day, after which the irregular ticking began.

Physical examination showed the membrana tympani apparently normal in both ears. The tonsil pillars were injected, the tonsils buried—medium in size, some pus expressed from the right. The nasal septum showed deviation to the right, high up, blocking the nose on that side; the entire mucous membrane was congested. The nasopharynx showed adenoid tissue in the vault. Both Eustachian orifices were clear and apparently normal. There was no abundance of secretion.

Functional Examination: Hearing tests show about normal results. The tinnitus of which the patient complains is audible to the examiner and has been heard as much as 33 inches from the right ear. The character of this objective noise can best be described as resembling the tick of a watch, having an almost metallic click. This click, however, is not regular and appears to be much louder at times. It is not synchronous with the pulse. With the help of the nasopharyngoscope, inserted through the left inferior meatus, a movement of the tubal muscles is clearly visible, which is synchronous with the tick. This is easily demonstrated by using the diagnostic tube and looking through the nasopharyngoscope at the same time. An actual opening of the lumen of the Eustachian tube, or pulling apart of the mucous membrane surfaces of the tube, I have been unable to visualize. I wish to emphasize that there is no movement of the membrana tympani, to be made out at any time.

Conclusions: I believe this to be a case belonging to the class of motor neuroses, which are again divided into: 1. Spastic contractions of the muscles of the auricle. 2. Spastic contractions of the intratympanic muscles. 3. Clonic spasms of the muscles of the Eustachian tube. It is to this latter subdivision that our case belongs.

Politzer writes as follows: "This condition has been independently observed by Schwartz, Brunner, Todd, Boeck and the author. In the cases observed by the author (Politzer) the cracking sound was caused by the contractions of the muscles of the tube and resembled the irregular ticking of a watch held at some distance from the ear, the sound continued during sleep and could not be voluntarily suppressed by the patient. Associated with every cracking a corresponding contraction of the soft palate could be seen. Galvanization of the soft palate and massage of the region between the ramus of the inferior maxilla and the mastoid process have proved, up to the present, the best therapeutic measures."

In our case a slight twitching of the soft palate was also observed with each tick. Holding the soft palate up had no effect upon the noise.

I have presented this case because I believe it to be a condition met with very infrequently and I hope that in the discussion suggestions as to treatment may be brought out. I have purposely refrained from removing any pathology in order not to disturb the clinical picture. However, I do believe that the tonsils and adenoids should be removed, and possibly a submucous resection added later, in order to remove any source of irritation in this region.

An Introduction to the Rediscovery of Wittmaack. Dr. Conrad K. Gale.

Published in full in THE LARYNGOSCOPE, July, 1930.

Analogy Between Cholesteatoma and Skin Cancer. Dr. Joseph Fischer.

Published in full in THE LARYNGOSCOPE, June, 1930.

DISCUSSION.

DR. FRIESNER: I do not know that there is much to add. I had the pleasure of seeing Dr. Fischer's slides some time ago. There is very little to handicap him in his English, yet the basic facts of his paper are as follows: He says the tendency of normal epithelium is to proliferate with great speed, to grow along the surface. When epithelium is so influenced that it acquires an abnormal function—that is to say, when its normal activity is destroyed, it grows with greater rapidity than normal; but instead of continuing as a covering membrane, it grows into the depth. Whatever the process necessary to alter this biological function of epithelium, the experiments of the Japanese have shown that after repeated insults of the epithelium over a long period of time—insults, each of which is sufficiently severe to cause a reaction and yet not sufficiently severe to cause cell death—the epithelium loses its physiological function and acquires a function of growing-in, digitation into the subepithelium. Some of these digitations become separated from the original covering and become skin islands. The cells of these skin island maintain or retain the peculiar characteristics that the original epithelium has acquired through prolongation—that is to say, they proliferate and reform, and because of the proliferation of these islands they form skin circles, the so-called cancer pearls. Dr. Fischer says that what the repeated irritation of tar has done to skin, the insults of chronic ear suppuration have done to the epithelium of the external auditory canal, and as the result a cholesteatoma forms.

His theory is perfectly logical, and there is this striking analogy between skin cancer and cholesteatoma. If we look for the reason for the difference between the so-called cancer pearls, which are masses of living epithelial cells, and view the extent of the epithelial cell formation of the pearls in cholesteatoma where you have living cells only in the basement membrane and then dead epithelium cells coiled up (as a rope is coiled) within this living basement membrane—perhaps differences in the nutrition of the cholesteatoma in bone under pressure may account for this; but that there is a striking analogy there is no doubt, and I believe that Dr. Fischer's theory is perfectly logical.

THE PHILADELPHIA LARYNGOLOGICAL SOCIETY.

Regular Meeting, Wednesday, Feb. 12, 1930.

Accessory Sinus Disease in Children. Dr. Lee Wallace Dean.

Published in full in THE LARYNGOSCOPE, May, 1930.

DISCUSSION.

DR. R. H. SKILLERN: Gentlemen, I do not feel like discussing this paper tonight because I recall only too well what happened three years ago. I was invited to a dinner in New York at the New York Academy of Medicine and I was sitting next to a very prominent man and we began to talk shop. He said, "What do you think of Dr. Dean's deductions?" This man was an old friend of mine and I told him exactly what I thought. That summer at Atlantic City, Dr. Dean read a paper. This gentleman got up and discussed it and after he said what he wanted, he remarked, "One of our colleagues from Philadelphia can tell you something about this." You can imagine how I felt, so I got up and told the truth, from my point of view. I will not repeat what I said then. I propose to excuse myself in this way, that it was along opposite lines. I remember saying that on the Atlantic seaboard we do not have the prevalence of sinus diseases that they have out west. We do not see the sinus conditions here that Dr. Dean does out there. Listening to him tonight, we can see that we are going along the right lines—along nutritive lines, helping Mother Nature along.

At our clinic, during the past several years, I do not recall a single operation that we have had on a child, I mean single radical operation. Such a procedure as a Caldwell-Luc on a child is unthinkable, or any operation along these lines. It seems to me that Dr. Dean is striking the right key in this respect.

Concerning diagnosis, it is very difficult to do anything with children. You cannot question them and it is almost impossible to elicit any further symptoms. We have tried everything and in most cases we found that proper nutrition played a big part and Nature would come along and help to bring the child around. It seems to me that Dr. Dean is on the right track, when he is supposing that the lack of Vitamin A is more than prejudiced to the growing child and while they are just suppositions, these things are going to bring us around. After all, most of us here have seen in our medical lives that the suppositions of today are frequently the realities of tomorrow.

DR. RIDPATH: I was very glad to hear Dr. Dean this evening. I happened to be present at a meeting in Washington several years ago and Dr. Dean presented a very lovely essay on the treatment of sinusitis in children, and at that time I and others voiced the same opinion that has been voiced tonight, that we have less sinus infections in children here than they have in the Middle West. In the last two or three years I have seen quite a good deal of infection of the various sinuses in children; not as much as Dr. Dean, but a considerable amount, perhaps more than I wanted to see. Among others, I operated on a little girl of six for a frontal sinus infection. It was the only thing, in my opinion, to do for that case. I have operated for infection of the maxillary sinus in a number of children. Dr. Skillern and myself have operated on several children on the sphenoid on account of a disturbance of vision. We have also found the ethmoid frequently involved, so we do have some infection in children, but, I repeat, I do not think we have nearly as much as they have in the Middle West.

It has always been a question in my mind why we have a paralysis of the cilia and infection of the sinuses when the cilia, as we understand, can throw off any foreign body or any infection and they are able to evacuate to a certain extent that particular cavity. Now, Dr. Dean has brought out very vividly that the action of the cilia is practically *nil* or at a standstill, so that infection can take place very readily. The tissue, in other words, is not a normal tissue at the time infection takes place.

In reference to lavage of the maxillary sinus in asthmatic cases, I think this may be very beneficial. I had a gentleman who had asthma for 30 years. He was in such a condition that his business was at a standstill and he felt very much below normal. A lavage of the maxillary sinus, simply for diagnostic purposes, revealed no infection macroscopically. In other words, the wash was clear. After the first washing this particular individual did not have an asthmatic attack for three months. He returned and a second washing apparently relieved him for nearly a year. I have seen him only once since and did a lavage and have not seen him since. In some of the cases that we have of this character, do not hesitate to do a lavage. It should be one of the things that might bring about a cure.

Dr. Dean, I personally thank you for this paper. I have learned a great deal. DR. ERSNER: It was indeed a treat to hear Dr. Dean. On analyzing his subject, he gives us three salient points: 1. Preventive medicine. 2. Suppurative sinusitis. 3. Conservation of tissue not yet destroyed. To briefly reiterate, I might say, that under preventive medicine, Vitamin A is an essential component in diet. All efforts should be made to teach the profession, as well as the laity, the importance of a diet containing Vitamin A and its relationship to sinus disease. Under Caption 2, once suppuration has taken place, surgical interference is indicated in order to promote drainage and create ventilation. We must institute such hygienic and therapeutic measures that will help clear up the suppuration. Strict adherence to a diet containing Vitamin A will rescue the tissues not yet destroyed.

Dr. Dean mentioned the occurrence of the eosinophil and its relationship to vasomotor rhinitis. Several years ago, Dr. Coats and I made a study of tissues obtained from chronic maxillary sinuses and at that time we observed the presence of the eosinophil in the mucous membrane of the maxillary sinuses in asthmatics. We endeavored to explain the eosinophilic phenomena as that of a protein disintegration, an enzyme change or probably due to a lytic phenomena. The lytic phenomena may be caused by autogenic protein disturbances, which are clinically manifested by allergic symptoms and occasionally terminating in asthma.

I did not fully understand Dr. Dean's idea about the calcium found in the nasal secretions and I would like him to explain whether free calcium found in the secretions is due to bony absorption, thereby liberating free calcium, or whether it is due to faulty calcium metabolism. It is important to know the calcium phenomena from a therapeutic standpoint. If it is due to faulty calcium metabolism, then calcium should be eliminated. (To illustrate this, in diabetes the carbohydrates are limited to a great extent.) If, however, it is due to bony absorption, then all elements tending to promote calcium formation should be used. I thought for a while that my patients suffering with vasomotor rhinitis improved after taking viosterol. I was warned by many clinicians, however, that blood vessel and blood pressure changes take place after prolonged use of viosterol. It should, therefore, not be used promiscuously. I should like to know Dr. Dean's experience along this line.

Dr. Dean also mentioned nasal disturbances occurring in nephritis. Might I suggest that a chlorid test be performed in order to ascertain the relationship of the chlorids to certain types of vasomotor rhinitis?

On Dr. Dean's slide demonstration, he illustrated a maxillary antrum where lipiodol was instilled. Dr. Dean stated that within 24 hours the maxillary antrum had completely emptied itself; nevertheless, the antrum remained cloudy for several weeks. He further showed on slide demonstration that this same antrum cleared up.

In view of the fact that the antrum completely emptied itself within 24 hours, I feel that the ciliated epithelium could not have been very much affected, otherwise it would have taken longer than that for the oil to be completely eliminated. The reason the cloud persisted for several weeks may be attributed to the fact that whenever we employ hyper- or hypotonic irrigating solutions in maxillary antra, cellular edema results, and when X-rayed it will be manifested in the form of a cloud. Our interpretation therefore would be "cloudy antrum". This cloud will disappear in proportion to the subsidence of the edema. To revert back to our subject, the lipiodol employed in this case

probably produced cellular edema on account of it being a hypertonic fluid and the cloud disappeared as soon as resolution took place.

I wish to compliment Dr. Dean on the able and interesting manner in which he presented his subject.

DR. CULP: I really do not think that there is much for me to add to what Dr. Dean has already told us. I began to practice medicine a good many years ago, long before there was such a thing known as a vitamin. Of course, we all see quite a number of sinus diseases in children, but I agree with Dr. Skillern that on the Atlantic seaboard we do not see as much of this condition as is found in the West. We all know how difficult it is to examine the small child and how difficult also it is to get satisfactory results with local treatments. Being one of the old school of medicine, I was thoroughly taught that we cannot disassociate a particular part of the human anatomy from the rest of the body, especially when it comes to treatment. This is particularly true with nasal diseases in children. The great value of fresh air, sunshine and good food and the right hygienic conditions are most necessary in association with local treatment. Personally, I have seldom been compelled to do an external operation for sinus disease in very small children. There is no doubt that in the course of time what Dr. Dean and his assistants are now doing will show up in a vast improvement in the treatment of these conditions, by physicians who are now practicing our particular specialty.

It has been a great pleasure for me to hear Dr. Dean tonight, and it is to be hoped that we will all hear him again after he has made further investigation along the line indicated tonight.

DR. BURNS: I have had many years' experience in the Pennsylvania Institute for Feeble Minded and Epileptics, and after 18 years' service find that cases of sinusitis have been prevalent in children with endocrine disturbances. It seems to me that probably Dr. Dean could help us out by giving us his experience on the lines of endocrine study. If there is anything that he could offer, there are many who would be very greatly benefitted.

DR. STOUT: I would like to ask Dr. Dean if, when performing a window operation, does he remove a portion of the inferior turbinate and, if so, how much of it does he remove. Many children have evidence of sinus trouble, especially those with allergic conditions. If X-rays are made of all children coming to a clinic, it is astounding the number who have evidences of sinus disease, shown by the X-ray pictures. The time may come when all children who have not been benefitted by nose and throat operations and treatments will be X-rayed for sinus disease. Something was said about sinuses being sterile. Frequently we find almost no bacteria and only one or two polyps in the antra in allergic cases. These can be diagnosed with an injection of lipiodol followed by X-ray, each antrum injected and X-rayed separately. The lipiodol leaves these allergic antra about as quickly as it does from those that are non-allergic.

DR. M. SOLIS-COHEN: I was very much interested in what Dr. Dean said about the cases that were diagnosed as tuberculosis. It is a common occurrence in children to find pulmonary fibrosis in upper respiratory infection. This frequently occurs at the apices. It used to be taught that anything in the apex was tuberculous and anything in the base was nontuberculous. Several years ago I read a paper on "Nontuberculous Infiltration of the Pulmonary Apices, Simulating Tuberculosis".

My experience has been that after the removal of diseased tissue, the bacteria remain. Merely removing infected tissue does not remove the organisms. The rhino-laryngologist does not remove infection. After he removes the tonsils the bacteria still may be found in the tonsillar fossae and in the rhinopharynx, where they continue to infect. Dr. Dean told us that until we raise the resistance of the individual against the infecting organisms he will remain infected. I believe that in a great many of these cases of sinus infection that will not respond to any local treatment of the nose, we should raise the patient's bactericidal power by the proper administration of a proper vaccine that contains the infecting organism, such as a pathogen-selective vaccine.

I have heard Dr. Skillern and Dr. Ridpath say before that we do not have much sinusitis in children in the eastern part of the country. It may be that

we do not have serious trouble, but I think we have a great deal of sinus trouble that is probably unrecognized. In that connection I want to speak of symptoms. Someone said it is very difficult to obtain symptoms from an infant. If you will question the mother you will often obtain a history of frequent colds and coughs and attacks of otitis media. I have a 14-months-old baby in the hospital that is having its third attack of bronchopneumonia. In many of these cases you will find fibrosis of the apices of the lungs. If you get a dullness there, not due to tuberculosis, you are dealing frequently with a condition secondary to chronic sinus infection. When you get symptoms of frequent colds and of malnutrition, if you make a pathogen-selective culture and administer a vaccine made chiefly from the organisms against which the child lacks bactericidal power, you will frequently cure patients that you could not cure before. Vaccines so made are very potent. With this vaccine you get a very marked reaction with a dose of 5,000,000 or 10,000,000 organisms.

In regard to cases of nephrosis, I feel that frequently the kidney condition is secondary to an upper respiratory infection. In such cases I make pathogen-selective cultures of the urine and of the upper respiratory tract and frequently find in both the same organism that grows in the patient's blood. Many cases have improved greatly when treated with a vaccine made from such an organism.

DR. WIDMANN: Experience in the X-ray diagnosis of naso-accessory sinus disease in very young children, particularly between the ages of two and five, until recently has been very limited. This is probably due to the prevailing conviction among clinicians and laryngologists that this procedure was of little value. The technical difficulties in the past of making fast exposure to avoid movements with struggling children and to get accurate positions are also somewhat responsible for the indifference on the part of the radiologist to make these studies. For a time it was thought that such examinations could only be satisfactorily done under chloroform anesthesia. High-speed X-ray films can now be obtained, and recent experiences indicate that these studies are particularly beneficial in studying the antri which very frequently are found to be bilaterally involved, and this involvement may simply be due to an edema of "congested state" of the mucous-lining membranes referred to by Dr. Dean as a preinfection condition. If the radiologist is going to render a real service he must produce uniformly good technical films with sufficient detail to be of diagnostic value. I believe that the radiologist and laryngologist should co-operate and study the naso-accessory sinuses in children in conjunction with X-ray films more routinely so that a real evaluation of this procedure may be developed.

DR. DEAN (in closing): The very excellent discussion by Dr. Solis-Cohen illustrates the importance of sinus infection in children. I am quite accustomed to have the pediatrician send children to me with the statement that the fever and other systemic disturbances in the children are due to an infection about the nose, throat or ear. The pediatrician discharges the patient from his service and it is necessary for us to accept and treat the patient. In my experience the pediatrician has always been right and the cause of the trouble has been in the ear, nose or throat, usually in the nasal sinuses.

Regarding nephrosis or acute parenchymatous nephritis, or whatever you care to call it, will say that in discussing that subject, I realized that I had entered the province of the pediatrician. It is a condition characterized by much albumin in the urine and the marked generalized edema. Until recently I assumed that the sinus disease, which so often accompanied this condition, was an important etiological factor. I hold no definite opinion in this matter. It is customary in the process to find all of the nasal sinuses blurred. Recently I observed two cases; one in an adult and one in a child. They were early cases. All of the sinuses were blurred. There was no evidence of infection in the nose. I am inclined to interpret this condition as being an edema of the lining of the nasal sinuses dependent upon the systemic condition; that the edema interferes with ciliary action, causing stagnation in the sinuses, with resulting infection. Be this as it may, I am certain that in nephrosis the most simple treatment, as the use of ephedrin intranasally, should only be resorted to. All operations on the nasal sinuses, including puncture of the maxillary

sinuses, are contraindicated during the acute exacerbations of this condition because of the ease with which septicemia is produced in this condition by minor surgical procedures. The use of ephedrin does shrink the mucosa in and about the ostia of the sinuses and does help in this disease.

I was interested in what Dr. Ersner had to say regarding calcium metabolism and its relationship to nasal sinus disease. This work is in its infancy. It seems to me to be a field that will give us much important information.

Whether or not the so-called infectious arthritis is allergic or infectious, it is always important to eradicate a nasal sinusitis if it is present. It is particularly important in cases of glomerular nephritis and infectious arthritis to pay attention to the nasal sinuses if the tonsils have been removed. A common observation is that in infectious arthritis, the patient's tonsils have been removed with benefit, but the arthritis persists in a milder degree. In such a patient it is particularly important to examine the nasal sinuses.

In the sinus lung cases we do get excellent results from work on the nasal sinuses. Certainly these patients do not do well unless the nasal sinusitis is controlled.

Radical operations on the nasal sinuses in children are contraindicated unless some local complication as orbital cellulitis demands this procedure.

In making a meatal opening in the nasal sinus in children or infants, I do not remove a piece of the turbinate. It is often necessary in young children and infants to elevate the anterior part of the turbinate so as to have ready access to the meatal wall at the time of the operation. As soon as the operation is completed, the turbinate is brought back to its normal position without any deleterious results.

Regular Meeting, Tuesday, March 4, 1930.

The Relative Position of the Deeper Vessels of the Neck with the End of the Needle in Local Anesthesia Around the Tonsil. Dr. Phillip S. Stout.

Published in full in THE LARYNGOSCOPE, July, 1930.

DISCUSSION.

DR. BUTLER: This is an important subject. There are two ways of avoiding this danger. One is by using a long curved needle and injecting close to the capsule from above downward. The other is by grasping the tonsil and pulling it out of its bed before injecting. In this way we can see the depth to which the tonsil extends.

DR. SHUSTER: I think that if we take these X-ray pictures too seriously, we will all have to stop using local anesthesia in tonsillectomies. All of us who have been in practice any length of time have operated on hundreds of cases and very seldom have had complications of the kind mentioned by Dr. Stout. As to the interpretation of the X-ray pictures, one must bear in mind that they are shadows and the actual location of the needle may be an illusion. There is quite some distance between the tonsil and jugular vein and the very movable carotid artery must be crossed before the vein is reached. I should think it would be very difficult to fix the vein with the needle unless the artery is first penetrated and fixed, when going from the throat outward. If one penetrated the mucous membrane to the capsule of the tonsil in injecting the local anesthetic, and then pushing the needle and tonsil medialward to the throat it is hardly conceivable that the jugular vein can in any way be reached.

DR. LAESSLE: I have found that if you draw the tonsil forward and place the syringe at right angles to the tonsil and the inject back of the tonsil, you will avoid the vessels.

DR. STOUT (in closing): There isn't very much I would like to add. I do not want you to get frightened and stop doing tonsillectomies under local anesthesia, but for the benefit of the younger men, if you are not quite so bold, it will be a little bit better.

Complications of Tonsillectomy. Dr. William Hartz.*Published in full in THE LARYNGOSCOPE, August, 1930.*

DISCUSSION.

DR. BUTLER: This is a timely paper, which interests us as we all get complications. The nursing, as Dr. Stout said, is most important. Most of the fatalities of which I have heard have been caused by unrecognized bleeding during the night. The nurse did not note the signs of hemorrhage and the interne was not called until it was too late. During the operation we see and control the bleeding.

Dr. Cohen's report about the broken needle reminds me of a nurse, whose tonsils I removed under local anesthesia. The steel needle broke, leaving a quarter of an inch of it in the peritonsillar tissue. We fluoroscoped it at once, located and removed it with a hemostat. We tried the electro-magnet but it would not pull it out. Since then I do not use steel needles.

DR. COHEN: I would like to relate two experiences; one a complication and the other an accident during tonsillectomy.

A man, age about 35 years, referred for tonsillectomy, had a negative history, except a tendency for colds. Coagulation and bleeding time were within normal limits.

Within one hour after his operation, done under general anesthesia, I was called on account of the patient's inability to breathe. Signs of suffocation had set in. Examination revealed a generalized ecchymosis or extravasation of blood in all the tissues of the palate, pillar, fossae and pharynx. No bleeding externally.

The patient was brought back to the operating room and rapid and deep scarifications and incisions were made into all the tissues. Bleeding followed, which was easily controlled; excessive bleeding produced in the fossae was controlled by clamps. Half of the uvula, which had become very large, was cut away. No tracheotomy was performed.

The patient, living out of town, was kept in the hospital a week, no further complications setting in. Complete blood studies were made, but no light or information was obtained from any of my colleagues.

Case 2: A professional danseuse, who had changed her mind from local to general anesthesia, began to vomit during operation. I was introducing a needle in the course of applying a suture, when I was compelled to quickly withdraw the needle on account of the patient's wrenching. During this manipulation the needle broke and I felt sure that the pointed end remained in the tissues. After completing the operation, X-ray revealed the broken needle in the tissues of the fossa.

I decided to wait until the operative swelling would subside before attempting to remove it, which I did after several attempts, beginning about five or six days after operation. It is the first accident of this type in my experience. (Films were passed around.)

DR. ALEXANDER: Twice in my experience I have had very acute growths appearing after tonsillectomy. The first one was very annoying to me and very startling. The length of time it took for this growth to form was about a week, and in the first instance I operated, not knowing what else to do, and everything turned out all right. A few years later, I had the same condition occur in a private patient and, naturally, it was very startling to the family and they came to me at once, wanting to know what was wrong. They were absolutely sold on the idea that the tonsils were not properly removed. I considered that this was an acute growth of tissue between the tonsil capsule and the muscular wall. I thought it would be a good opportunity to have this subject come before this Society to see whether my deductions as to the cause are correct. This is the first time I have had an opportunity to bring this up.

DR. STOUT: I think emphasis should be placed on the complications of tonsillectomy. Looking after the case after operation is as important, if not more important than the operation itself. The physician gets a great deal of discredit if something happens after operation. I will cite a few cases I have had.

A young woman, who had a goitre, came to me for a tonsillectomy. Of course I knew she had a goitre and I asked a good operator to assist. She

claimed she had peritonsillar abscess about every six weeks over a period of years. I know that she had it every three months, and that is often enough. We operated in a small hospital and the operation was all right. Her pulse was 150 before the operation and 120 after the operation. She had a trained nurse and her mother was with her. At midnight of the day of operation I went to see her. After I left the nurse went out to get something to eat. She was a high-strung patient and the thought of being left without a doctor or a nurse excited her and she gave one pull on the brass rods of the bed and was dead. Acute dilatation of the heart probably caused death. Her mother gave me this history. She was present at the time. Had I known the nurse was going to leave for a short while I would have remained until she returned and the patient probably would not have died. The above case I reported some time ago before this Society.

I once operated on twins and when I went back in the evening to see them, I found one but could not find the other. I asked a nurse to help me find him and we went up and down the ward. Finally we found the bed and he was all covered up. The nurse didn't know there was anyone in the bed. He had vomited and he was lying in the vomitus. I do not know what might have happened during the night if he had not been found.

Another operation we had was on a little fellow and he wasn't doing so well. I went back a couple of times after the operation. I asked the nurse to tell the night nurse to watch this child and have the interne see him and I said I would be back at night. I got there, asked how the child was, and said I wanted to see him. The youngster was practically pulseless and had all the symptoms of hemorrhage. I called the interne and asked him if he knew about this child, and he said he did not. We looked down the little fellow's throat for the site of the bleeding and he vomited a very large amount of blood. He had vomited several times before. We worked with him until one o'clock in the morning before we finally controlled the oozing, which was from both tonsillar fossae. He recovered.

What Dr. Hartz has said is very timely.

DR. HARTZ (in closing): The only thing I can add is that I was prompted to write this paper from observations on our clinic cases. Dr. Ralph Butler put me on the track by making the statement that a little more caution should be taken with our cases in the clinic.

NASHVILLE ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

Meeting of Feb. 17, 1930.

Dr. R. J. Warner, Chairman, Presiding.

Bilateral Cavernous Sinus Thrombosis. Dr. E. L. Roberts.

Colored female, age 40 years, developed suppurative of the left parotid gland and was brought to the Nashville General Hospital. The gland was opened by Dr. R. N. Herbert and much pus was evacuated. Three days later, left eye began to show redness and edema and within 12 or 15 hours later, right eye did the same thing. The next day I was called at 3 p. m. and reached the patient at 5 p. m. The patient was unconscious when I arrived and died about 40 hours later. The eyes were both swollen, red and protruding. Dr. E. L. Rippey, the house surgeon, had made a diagnosis of cavernous sinus thrombosis and in this diagnosis I fully concurred.

Dr. W. W. Wilkerson, Jr., Secretary-Treasurer.

Meeting of March 17, 1930.

Dr. R. J. Warner, Chairman, Presiding.

Case of Congenital Choanal Atresia. Dr. Herschel Ezell.

Miss T., age 30 years, came to see me, Feb. 18, 1930, on account of sore throat due to a simple pharyngitis. While treating her for this I discovered that the right side of her nose was completely closed. She told me that the right side of her nose had been closed all of her life. Her mother told her that she noticed the obstruction, or closure, when the patient was an infant. The discovery of the nose affection was incidental to the throat complaint so far as I am concerned.

With regard to the nose, the patient states that she has never been able to breathe through the right side. She has no pain, only has a cold occasionally, and then she is able to get rid of it quickly. She states that her nose fills up posteriorly and that she expectorates a large amount of mucus from her throat occasionally. She claims to breathe freely through the left side of her nose and is not aware of mouth-breathing, if such exists.

The patient is somewhat anemic, but is fairly strong. She is able to attend to her business duties and is rarely ever sick and feels good nearly all the time.

Examination of the nose shows complete obstruction of the right side. This obstruction is very near the nasal orifice. The anterior layer of the obstruction is covered with epidermis. Posteriorly, with a small mirror, the right side of the nose seems to be open for a considerable distance and there is nothing abnormal there so far as I am able to determine. Examination of the left side of the nose shows it to be quite normal in every respect with the exception of a slight deviation of the nasal septum to the right. Transillumination shows the sinuses clear, the hearing of each ear is normal. The patient was referred to Dr. H. S. Shoulders for an X-ray examination. Dr. Shoulders reports: "The frontal sinuses are entirely absent; anterior ethmoids on both sides are clear; both right and left antrums are clear; all of the bones of the nose seem to be within the normal except there is a slight deviation of the septum. The obstruction in the nose does not appear to be a bony obstruction." Dr. Shoulders expresses an opinion that an operation could be done without jeopardizing the patient. Patient presented.

DISCUSSION.

DR. EUGENE ORR: I was glad to see this case. Personally, I have seen two cases; one was relieved by dilatation, and the other by operation. I think

Dr. Ezell's patient could be relieved, even if she had a perforation opposite the obstruction. It is a question if this woman is breathing enough, not a mouth-breather, and she doesn't seem to be, and she never thinks about it. I believe that I would just leave her alone.

DR. E. L. ROBERTS: I think that I would advise operation, even with a perforation opposite the obstruction, she ought to breathe better. The fact that she is comfortable now would not keep her from being more comfortable without the obstruction.

DR. HILLIARD WOOD: The thickness of this obstruction could be easily determined by injecting novocain and perforating it. What this showed would determine my treatment. If it is a mass of adhesions I think that I would not favor operation.

Meningitis Following Chronic Sinusitis. Dr. W. W. Wilkerson, Jr.

Patient, S. J. D., white, female, age 32 years, was first seen in my office some three months ago, complaining of having had trouble with the right side of her head since last April. This trouble consisted of inability to breathe through the right naris, headaches localized particularly over the right eye, radiating posteriorly to the occiput, and an unusual amount of discharge.

On examination the left naris was essentially negative. The right naris was filled with mucopurulent material, the turbinates were congested, several moderate-sized polypi were present, springing from beneath the middle turbinate. The polypi sprang from the posterior end as well as the anterior end of the middle fossa. The tonsils had been previously removed. Teeth were in fair condition. The nasopharynx was negative, but a large polypi was hanging into the nasopharynx, protruding from the right side. Transillumination revealed the right sinus to be cloudy. An X-ray examination of the sinuses showed the right maxillary and the right anterior ethmoids to be cloudy. She was unable at this time to be operated on; therefore, we irrigated the right antrum and found much pus present. She immediately began to feel better and did not return to the office for some two weeks.

On Jan. 2 we removed several large polypi in order to have more room and to establish better drainage, in view of future operation. The operation was uneventful and the patient recovered in a short space of time. Approximately a month later she entered the hospital. Under general anesthesia the middle turbinate on the right side was removed, along with several polypi. After removing the middle turbinate I found the medial plate of both the anterior and posterior ethmoids to be almost completely destroyed, bringing the ethmoid cells into full view. These cells were broken down and filled with pus and degenerated mucous membrane. We also made a permanent opening into the right antrum without removing any of the inferior turbinate. We then packed the nose to control the hemorrhage and sent the patient to bed in apparently good condition.

The patient was very nervous prior to the operation and had been complaining of severe headache for some few days. She reacted from the anesthesia in the usual manner and complained of headache and nausea throughout the day. By late afternoon both nausea and headache were apparently much worse. We attached no special significance to this at the time as we attributed it to neurosis. The next morning these symptoms were still more aggravated and she had been unable to take any fluid by mouth. We therefore began giving her hypodermoclysis, 50 per cent glucose intravenously, and 5 per cent glucose Murphy drips. Approximately 30 hours after the operation she became comatose, at which time we became suspicious of meningitis. At this time a consultant was called and he also was suspicious of meningitis and advised spinal puncture. A spinal puncture was done and fluid was found to be under considerable pressure and markedly cloudy. A specimen was sent to the laboratory and the offending organism was found to be pneumococcus. On the second day following the operation another spinal puncture was done, withdrawing about 60 c.c. of spinal fluid under pressure, and 50 c.c. of pneumococci antibody solution was given. This seemed to have no effect on the patient in any way and three days after the operation she died of cardiac failure.

From the time the patient became comatose, which was some 30 hours after the operation, no change was noted in her condition with the exception that her

heart gradually became weaker. She was given supportive treatment, saline and glucose, throughout the entire time. A postnasal plug was necessarily used at the time of operation and so far as I was able to ascertain there was nothing unusual in regard to the operative procedure.

DISCUSSION.

DR. ROBERT SULLIVAN: Opening the ethmoid cells and removing part of the middle turbinate, or all of it, is most dangerous. If we could have our operative field sterilized, instruments sterile, then when we opened up cells, or made wounds, we would get infection, but in spite of that, I wonder if we don't carry in infection?

DR. W. G. KENNON: I think that we will have to keep on doing these nasal operations when necessary and ever so often one will die.

DR. HILLIARD WOOD: Several operations have been mentioned here that might be complicated by meningitis, but there is another—submucous resection. As to the anesthetic, I don't use ether for nasal operations. There are several reasons for using cocaine—it gives splendid anesthesia, especially if you cocaineize the nasal ganglion; cocaine-adrenalin gives a clearer field; and then I like to have the patient sitting up. It seems to keep my bearings. I stopped packing the nose years ago, thinking that it was risky. I think we might get infection from the packing. Suppuration of turbinates is the cause of meningitis without operation. We expect intracranial infection from otitic origin, but they occur from the nasal origin just the same.

Dr. W. W. Wilkerson, Jr., Secretary-Treasurer.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY.

SECTION OF OTOLARYNGOLOGY.

Meeting of Feb. 14, 1930.

Dr. Chas. N. Spratt, President, Presiding.

The Modern Classification of Ethmoiditis. Dr. Fred J. Pratt.

Osteoma of the Frontal Bone. Dr. R. O. Leavenworth.

(To appear in a subsequent issue of THE LARYNGOSCOPE.)

DISCUSSION.

DR. JOHN BROWN asked if X-ray treatment or anything of that kind had been tried on this case?

DR. J. S. WHITE asked if biopsy had been made?

DR. LEAVENWORTH stated that no biopsy was made as the pieces removed were so evidently ivory bone. He also said that he had not been given very much opportunity for treatment of this case after the acute process subsided; that he had not seen the patient for a number of years until he called him in the other day for this last X-ray. The patient is well, with no pain nor headache, and will not consent to an operation. Dr. Leavenworth stated that if an operation were done one could promise the patient nothing; while, on the other hand, he may go on for 20 years before he develops any distressing symptoms and, in his opinion, the 20 years of comparative comfort is a more certain thing than the results of surgery.

Dr. Walter E. Camp, Recorder.

